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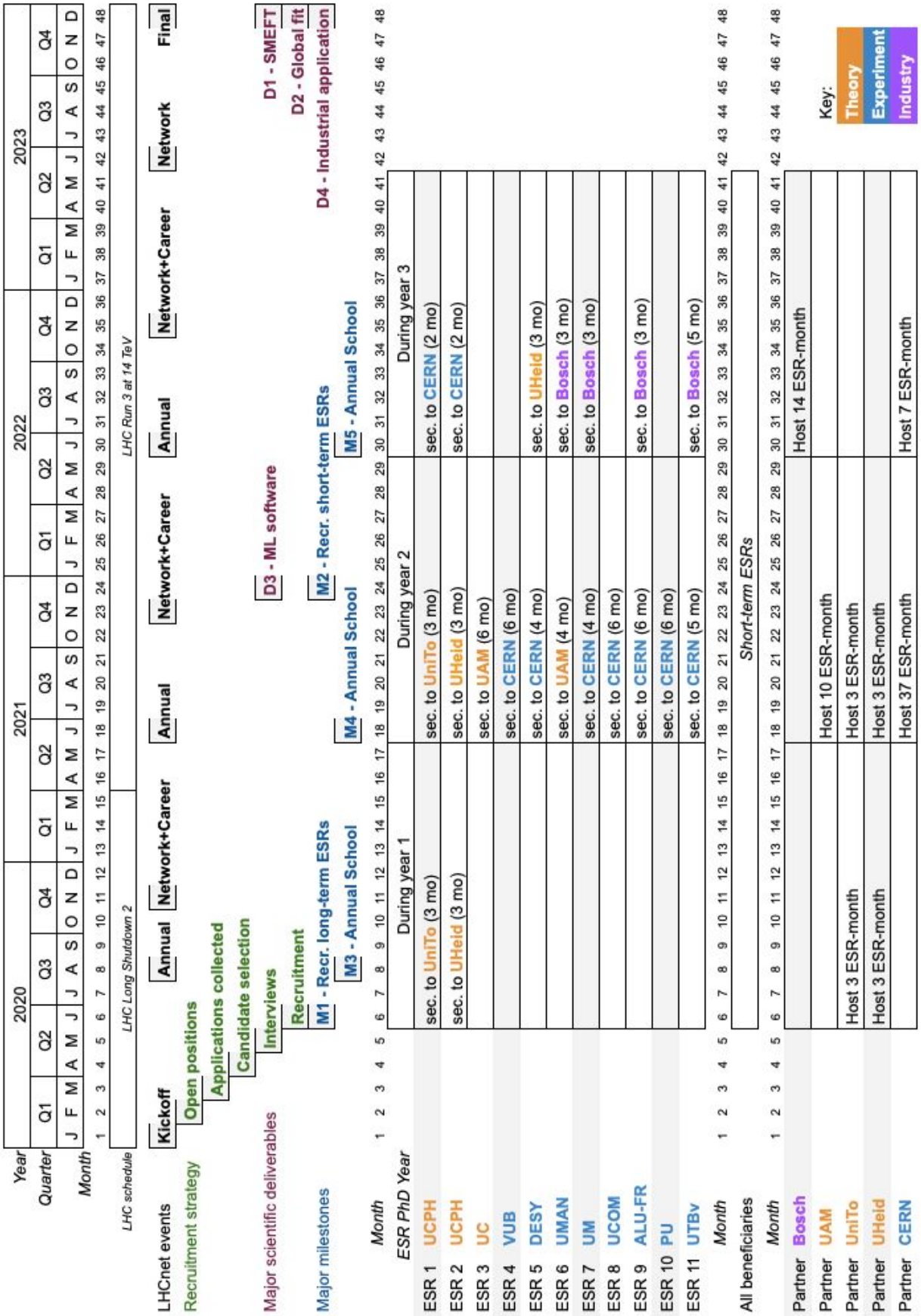
4. Gantt Chart



5. Participating Organisations

Beneficiary Legal Name: University of Minho (UM)	
PIC: 999995505	
General Description	University of Minho aims to be a University without walls, focusing on the regional, national and international socioeconomic environment. UMinho is a research University, engaged in the valorization of the chain Knowledge-Research, D&I as evidenced by a series of indicators. The ratio between PhD students and academic staff is over 1; the fraction of postgraduate students in the total student population is over 20%; the ratio between research projects and PhDs is over 0.5; around 150 PhDs are awarded every year; the average yearly production of refereed papers in scientific journals is impressive for an eclectic University: above 2/FTE/year; citations are strongly increasing every year; 250 R&D contracts are signed yearly with companies. Amongst the 33 UMinho Research Units evaluated by FCT in 2014, 1 was considered Exceptional, 12 Excellent and 10 Very Good. UMinho ranked 3rd in the Portuguese (PT) entities that managed more funds in the FP7, keeping that position in terms of PT Universities under H2020. There are presently 6 ERC Advanced and Consolidator Grants running, as well as a participation in another, which resulted in a funding of 9.8 MEuros. UMinho is also the only University in Europe that leads all Widening types of instruments: TEAMING, TWINNING, ERA-Chairs and previously REGPOT, corresponding to around 7 MEuros of UMinho funding. The EC also approved a FET project: Graphene Future Emerging Technology Flagship, where UMinho is the only PT University to be part of the Main Consortium. In the context of H2020, UMinho has seen already approved 55 projects, coordinating 11 of those. UMinho runs a project in collaboration with BOSCH – HMIEXEL "critical R&D around the development and production of advanced multimedia solutions for automotive cycle", which is one of the largest ever Academia-Industry collaboration projects in Portugal.
Role and Commitment of key persons (including supervisors)	**António Onofre** is a Professor at the University of Minho, since 2010, has acted as Head of the Physics Department (2015-17), Director of Laboratorio de Instrumentação e Física Experimental de Partículas (LIP) 2015-17, with around 200 researchers, Coordinator of LIP-Minho (2010-2015), with 30 researchers now since 2010. He has been recently National Examiner of several evaluation panels from Fundação para a Ciência e Tecnologia (FCT), and CERN Fellow Program since 2015 on, belongs to several Scientific Committees and has played the role of Reviewer for the Helmholtz Association of German Research Centers, in 2017. He was also member of the Publications Committee of the ATLAS experiment and Top-Properties Sub-Group convener (2008-2010). He will act as supervisor for the network (40%).
Key Research Facilities, Infrastructure and Equipment	The University of Minho has, a new fastly growing research Particle and Astro-particle physics group, since 2010, with already 30 collaborators, among Professors, PostDocs, PhD, Master and Undergraduate students, for which the University provided wide office space. The group has access to computing facilities located at the University with a Tier 2 GRID connection, as well as a new High Performance Computing (HPC) system and laboratories for hardware development. All PhD students will be integrated in the ongoing University activities and will be able to attend lectures, seminars and training events.
Status of Research Premises	The research facilities of UM are owned by the University.
Previous Involvement in Research and Training Programmes	Graphene-based revolutions in ICT and beyond, Graphene-Flagship Core 2 - 785219, H2020 (540k€); Opportunities for the young and graduates employability in Vietnam, KA 2 - Cooperation for innovation and the exchange of good practices, Erasmus+ (500M€); Graphene-based revolutions in ICT and beyond, H2020 (250k€); European Training Network to Accelerate the Development Chain of Nanostructured Polymers, H2020 (3.8M€); Graphene-Driven Revolutions in ICT and Beyond, FP7 (45M€).
Current Involvement in Research and Training Programmes	UMinho runs a project in collaboration with BOSCH–HMIEXEL "critical R&D around the development and production of advanced multimedia solutions for automotive cycle", which is one of the largest ever Academia-Industry collaboration projects in Portugal.
Relevant Publications and/or Research / Innovation Product	- Phys. Rev. D 98 (2018) 033004, arXiv:1711.05292; - Phys. Rev. D 97 (2018) 013007, arXiv:1711.04847; - Phys. Rev. D 96 (2017) 073005, arXiv:1707.01803; - Phys. Rev. D 96 (2017) 013004, arXiv:1704.03565; - Phys. Rev. D 93 (2016) 113021, arXiv:1605.02679.

Beneficiary Legal Name: The University of Manchester (UMAN)	
PIC: 999903840	
General Description	The University of Manchester (UNIMAN) is one of the world's top 50 universities. We attract the highest calibre researchers and teachers with 25 Nobel Prize winners among our current and former staff and students. In 2018 Manchester was ranked 34th globally, 8th in Europe and 6th in the UK according to the Academic Ranking of World Universities (ARWU). The University has 4,685 academic staff and 2,000 research staff. In 2016/17 we attracted £331 million (~€380M) in external research funding. UNIMAN participated in 380+ FP7 projects. In H2020 UNIMAN is currently participating in 240+ projects including 41 ERC fellowships, 48 Marie Curie Fellowships, and 22 Innovative Training Networks.
Role and Commitment of key persons (including supervisors)	**Dr Reinhild Yvonne Peters**: Reader at The University of Manchester (since 2016, before Senior Lecturer from 2013); Current ERC starting grant holder (COLORTTH) and soon ERC CG holder (TheHiggsAndThe7Tops); Division Chair of Particle, Nuclear and Accelerator Division at The University of Manchester; successfully supervised several PhD, master and bachelor students. Dr Peters leads the effort on ttH in Manchester, and is committed to participate in this network, supervise students and host short-term studentships.
Key Research Facilities, Infrastructure and Equipment	The University of Manchester has a world-class particle physics group of 100 researchers. The University will provide office space, extensive computing facilities, and world-class laboratory facilities for hardware development. The particle physics group has a Tier 3 GRID and GPUs, providing the students with access to the computing facilities. All PhD students are integrated into the group, can attend lectures, seminars and training events.
Status of Research Premises	The research facilities are independent and owned by the University of Manchester.
Previous Involvement in Research and Training Programmes	The University of Manchester has participated in 27 FP7 Marie Curie Initial Training Networks and over 30 Marie Curie Individual Fellowships and in H2020 is already participating in 22 ITNs and hosting 48 MSCA Individual Fellowships.
Current Involvement in Research and Training Programmes	The group is currently training 39 PhD students, taking in around 10 students per year, the majority funded by the UK Science and Technology Facilities Council. The group is host to one Marie Curie Initial Training Network (MCNet), with Prof. Mike Seymour acting as the Scientist-in-Charge of the network of 8 participant members and a budget of 4 million Euros.
Relevant Publications and/or Research / Innovation Product	- JHEP 11 (2018) 085, arXiv:1808.03599. - Phys. Lett. B 784 (2018) 173, arXiv:1806.00425. - Phys. Rev. D 97 (2018) 072016, arXiv:1712.08895. - EPJC 77 (2017) 292, arXiv:1612.05220. - JHEP 03 (2017) 113, arXiv:1612.07004.

Beneficiary Legal Name: VRIJE UNIVERSITEIT BRUSSEL (VUB)	
PIC: 999902094	
General Description	Vrije Universiteit Brussel (VUB) is a competitive, high-quality, socially committed and internationally-oriented university located in Brussels with more than 16,000 students. Add to that the 6,000 medical staff at its university hospital and the more than 160 research groups working on both campuses, and you get one of the biggest centres of knowledge in the capital of Europe. The university is an avid participant in European projects, and in particular in H2020-projects. There are about a 120 running research projects at VUB which are (co-)funded by the European Union, 30% of which are coordinated by VUB. The HEP@VUB research program embraces about 20 professors from theory to experiments about the smallest and largest structures in our universe. The IIHE, located at the VUB, is the largest institute for particle physics in Belgium. We had about 10 (level-2) convenors of CMS physics topics in the institute, including professor D'Hondt.
Role and Commitment of key persons (including supervisors)	**Prof. Jorgen D'Hondt** is the coordinator of the HEP@VUB program and co-director of the IIHE, the latter involving about 100 researchers in experimental particle and astroparticle physics. He acted as Head of the Physics Department and Chair of the Education Board of the Faculty of Sciences, was Chairperson of the CMS Collaboration Board and the CMS Career Committee, and is now ECFA Chair (2018-2020). His 15% commitment will be to supervise the PhD student to be hired and to lead WP6. Several postdoctoral fellows will connect to the research of the to be hired PhD student, e.g. Kirill Skovpen and Petra Van Mulders.
Key Research Facilities, Infrastructure and Equipment	The IIHE, with about 35-40 PhD students today, hosts one of the largest TIER-2 computing facilities supporting the CMS experiment at the LHC. Professor Jorgen D'Hondt has ample experience with training of PhD students and joint-PhD projects inside and outside Europe (in total 20). Many of his former PhD students and postdocs have received international prizes and obtained leading positions inside and outside academia. We organise annually a PhD school of 2 weeks covering a wide variety of specific topics in particle physics. A doctoral school program is organised by the university to support PhD students in sciences and engineering, and to provide them with training in general research skills.
Status of Research Premises	All premises that are used or occupied by HEP@VUB can be used independently, being owned by the Vrije Universiteit Brussel.
Previous Involvement in Research and Training Programmes	Previous ITN projects at VUB: GROWSPERM; ADOPSYS; ESSENCE; EURO IMPACT; NARNIA; previous IF projects: chiralMOF; EEUSUP. Professor D'Hondt organised the CERN Computing School in Belgium (2016) and many more international workshops and conferences.
Current Involvement in Research and Training Programmes	Current ITN projects at VUB: PET3D; DeLIVER; INDUCT; QUARTZ; FINESSE; xCLASS; mCBEES, RNAct. Aromagenesis; Current IF projects: ENIRIS; EPISTOP; High level CDFT; PROFILE.
Relevant Publications and/or Research / Innovation Product	Phys. Lett. B 695 (2011) 424, arXiv:1010.5994; Phys. Lett. B 716 (2012) 30, arXiv:1207.7235; Phys. Rev. D 86 (2012) 112003, arXiv:1209.1062; JINST 8 (2013) P04013, arXiv:1211.4462; Phys. Rev. D 97 (2018) 072008, arXiv:1708.02510; JHEP 1806 (2018) 102, arXiv:1712.02399; JHEP 1811 (2018) 131, arXiv:1807.02130.

Beneficiary Legal Name: Universitatea Transilvania din Brasov (UTBv)	
PIC: 999904131	
General Description	UTBv is the largest university in the Centre Region of Romania. It was founded in 1948 and has now 18 faculties, offering bachelor, master and doctoral studies to more than 20.000 students. UTBv awards approximately 50 doctoral degrees annually. Advanced research is developed in 29 research centres focusing on major topics of sustainable development: Renewable Energy Systems, novel Energy Efficiency in processes, advanced solutions for Energy Saving products and processes, Natural Resources preservation and use, Health and Life Quality, and Education, Culture, Communication and Economic Development. The R&D Institute of the Transilvania University of Brasov gathers all the 29 research centres, along with the Integrated Doctoral School and the post-doctoral programs. The R&D Institute is in the GENIUS Campus (Green, Energy Independent University Campus). The new location, infrastructure and software are part of the European Structural Funds project: *R&D Institute High-Tech products for sustainable development* that was finalized in 2013. The R&D centres have a very good experience in managing projects at national and international levels; during 2009- 2017, there were managed over 30 M€ in over 300 grants and contracts. The Multispectral Imaging and Vision (MIV) research laboratory has its roots in the former Image Processing Research Group, from the Research Institute of Computer Techniques (former "ITC"), Brasov. MIV is the result of combining two research groups currently acting in the C13 research centre of the R&D Institute of the Transilvania University of Brasov: the research group of colour image processing and analysis and group of machine learning and data-mining. MIV *project team* is currently composed of 1 full professor, 1 post-doctoral student and 1 PhD student. All the staff is involved in research in the domains required by the ITN project. For more details, the web site of MIV Laboratory is: http://miv.unitbv.ro/
Role and Commitment of key persons (including supervisors)	**Dr. Mihai L. Ivanovici (male) – professor,** holds a PhD in electronics from Politehnica University of Bucharest, Romania. He is a full professor and has more than 10 years of experience in managing various research projects (funded by EU structural funds and the Romanian government, the Ministry of Education and Research or by Romanian private companies) and participating as researcher in national and international research projects (e.g. The ATLAS Experiment at LHC); he is the author of more than 50 scientific papers published in international conferences and journals. He is head of MIV Laboratory, within Department of Electronics and Computers, Transilvania University of Braşov, România and member of the IEEE Signal Processing and IEEE Geoscience and Remote Sensing societies. His research interest and expertise are in the field of colour, multispectral and hyperspectral image processing and analysis. Currently he is supervising two PhD students who are both members of the ARIES UTBv team. **Radu-Mihai Coliban (male) – post doc**, holds a PhD degree from UTBv in electronics. He is a student member of IEEE. His research interest include color and multispectral image processing, satellite image analysis, hardware design languages, FPGA programming and ASIC design. **Stefan Popa (male) – PhD student;** is a licensed engineer in electronics and holds a MSc degree in Integrated Electronics Systems from Transilvania University of Brasov.
Key Research Facilities, Infrastructure and Equipment	Dell server for CAD software applications, including the licenced Cadence IC Full Design Suite. High-definition 4GHz LeCroy HDO 9404-MS oscilloscope
Status of Research Premises	All premisses are hold by the beneficiary.
Previous and Current Involvement in Research and Training Programmes	**NETIS 2011 CERN ACEOLE project** 1) Partner in the "ATLAS Experiment at LHC" national project as part of the Romanian contribution to the experiments at CERN – European Organization for Nuclear Research, Geneva, Switzerland, RO-CERN, funded by the Romanian Ministry of Research, contracts no. 8/2016 for 2016 – 2018 and no. 7/2012 for 2012 – 2015 (approx. 200k euros) 2) "IEEE SPS Summer School on Intensive Program on Computer Vision (IPCV 2014)", IEEE International LLC funding, contract no. 5860/21.05.2014, 2014 (5k euros) 3) Partner in "Analysis, Modelling and Simulation Techniques for Imagery, Bioinformatics and Complex Systems (ITEMS)" national project, funded by the European Social Fund and Romanian Government, contract no. POS-DRU/86/1.2/S/61756, 2010 – 2013 (approx. 200k euros)
Relevant Publications and/or Research / Innovation Product	R. Coliban, S. Popa, T. Tulbure, D. Nicula, M. Ivanovici, S. Martoiu, L. Levinson, J. Vermeulen, "The Read Out Controller for the ATLAS New Small Wheel", JINST 11 (2016) C02069. **Product**: the Read-Out Controller ASIC in the IBM 130nm CMOS technology, BGA packaging, radiation-hard.

Beneficiary Legal Name: Albert-Ludwigs-Universitaet Freiburg, Germany (ALU-FR)	
PIC: 999841760	
General Description	The Albert-Ludwigs-University Freiburg, with nearly 25,000 students and over 5,000 academic employees, is one of Germany's leading research institutions with an international reputation in many fields. It has been a comprehensive university since its founding in 1457, and its diversity of disciplines provides an ideal environment for innovative interdisciplinary studies. Laureate in the German "Excellence" competitions (2007 for research and teaching, and 2009 for instruction), and it is a member of LERU (League of European Research Universities). Website: www.uni-freiburg.de/
Role and Commitment of key persons (including supervisors)	**Dr. Andrea Knue**: Junior faculty member (Akademischer Rat auf Zeit, A13Z) at the University of Freiburg since 2017. Dr. Knue leads the measurement of the top-quark mass and the ttH search in Freiburg, and has a large track-record in teaching and supervising PhD students (supervision of 8 PhD students since 2013). She was awarded with the "Student Teaching Award" from the University of Glasgow in 2015. Dr. Knue is fully committed to supervise long-term and short-term ESRs with at least 25% of her time. Dr. Knue has been leading the top reconstruction group at ATLAS from 2015-2016 and is leading the top properties group at ATLAS since April 2017.
Key Research Facilities, Infrastructure and Equipment	The University of Freiburg has a world-class particle physics group of about 70 ATLAS members as well as research groups in theoretical particle physics and astroparticle physics. The University will provide office space and extensive computing facilities. The particle physics group has access both to the "Black Forest Grid" as well as the bwForCluster NEMO, providing the students with access to large computing facilities. All PhD students are integrated into the group, and can attend lectures, seminars and training events (also those offered by the DFG RTG 2044). In addition to the lectures given in the physics department, there will be additional machine-learning lectures and tutorials each semester that the PhD students can attend. The ESRs can furthermore participate in the transdisciplinary qualification program offered by the central "International Graduate Academy" (IGA). Female ESRs can join the "kite-mentoring" program for career development.
Status of Research Premises	ALU-FR is a public university with independent research premises.
Previous Involvement in Research and Training Programmes	ALU-FR has several graduate schools and cooperates in the training of doctoral students with European universities, e.g. the EUCOR network. The University of Freiburg has a solid track record in training experienced and postdoctoral researchers. During FP7, the University acquired ca. 130 EU-Projects, including ca. 20 ERC-Grants and a total of 24 Marie-Curie-Projects, among the latter 9 ITNs, 12 individual fellowships and one COFUND-Programme.
Current Involvement in Research and Training Programmes	Under Horizon 2020, the University was already successful in acquiring 58 EU-Projects, among these nine Marie Skłodowska-Curie ITNs and one COFUND-Programme; two ERC Advanced Grants, seven ERC Consolidator Grants and nine ERC Starting Grants. The physics department has a doctoral school: RTG 2044 - "Mass and Symmetries after the Discovery of the Higgs Particle at the LHC" funded by the DFG.
Relevant Publications	- arXiv:1810.01772 (submitted to EPJC) - Phys. Rev. D 97 072016 (2018), arXiv:1712.08895 - JHEP 10 (2018) 159, arXiv:1802.06572 - JHEP 11 (2017) 191, arXiv:1708.00727

Beneficiary Legal Name: Palacký University Olomouc (PU)	
PIC: 909744571	
General Description	Palacký University Olomouc is one of the largest universities in the Czech Republic and the only non-Prague institution fully taking part in the research at the ATLAS experiment at CERN. PU's Faculty of sciences includes the study programme of Applied Physics and its ATLAS members pursue detectors R&D as well as physics analysis in forward and top quark physics.
Role and Commitment of key persons (including supervisors)	**Dr. Jiri Kvita** obtained his PhD in particle physics, Charles University in Prague, 2009, in collaboration with the DZero experiment at Fermilab, performing the first pioneering measurement of top quark transverse momentum. Kvita leads the particle physics group at the Joint Laboratory of Optics, maintaining also an overlap to astroparticle experiments (PAO, CTA). The ATLAS group has 10 members at all stages ranging from Bc, Msc. and PhD students to postdocs and junior and senior researchers and a technician. Kvita teaches extensively 5+ courses and has supervised 3 PhD students, 4 MSc students, and 2 Bc students. Expected FTE on the project is 0.2 including research, training and supervision of students, and organization of Network Meetings in WP8. Previously, Kvita was research assistant for the Simon Fraser University, Burnaby, Canada as researcher at the ATLAS experiment at CERN (2011-2013), CERN Research Fellow (2009-2011), Fermilab Student Fellow (2007-2008), and a student and researcher at Institute of Particle and Nuclear Physics, Faculty of Mathematics and Physics, Charles University, Prague (2001-2009).
Key Research Facilities, Infrastructure and Equipment	Palacký U provides modern physics laboratories oriented towards quantum, laser and applied optics and material science in applications to R&D in astroparticle and particle experiments in its Joint Laboratory for Optics. The technical background for students includes office space, computing resources; lectures, and department as well as the astroparticle group seminars, which would welcome any participating students. Lecture topics taught by group members range from statistics and data analysis to quantum field theory, offering important exposure to a mixture of theoretical as well as experimental subjects. Active participation of researchers in current topics in HEP analyses provides students a wide range of Bc/MSc/PhD themes to work on, also in cooperation with the Department of mathematics oriented to data science and machine learning.
Status of Research Premises	Local research facilities are independent and owned by the Palacký University.
Previous Involvement in Research and Training Programmes	Co-recipient of CZ Examining the microcosm using the CERN infrastructure, LG15052 (2015-2017)
Current Involvement in Research and Training Programmes	Recipient of Czech national grant Novel techniques for boosted top quarks reconstruction for new physics searches at LHC, GACR 19-21484S. Co-recipient of CZ Getting new knowledge of the microworld using the CERN infrastructure, INTER-EXCELLENCE LTT17018.
Relevant Publications and/or Research / Innovation Product	- Nucl. Inst. Meth. A 900 (2018) 84, arXiv:1806.05463. - JHEP 11 (2017) 191, arXiv:1708.00727. - EPJC 76 (2016) 538, arXiv:1511.04716. - Phys. Rev. D 93 (2016) 032009, arXiv:1510.03818. - Phys. Lett. B 693 (2010) 515, arXiv:1001.1900.

Beneficiary Legal Name: Kobenhavns Universitet (UCPH)	
PIC: 999991043	
General Description	The effective field theory (EFT) phenomenology research group at the Niels Bohr International Academy (NBIA), of the Niels Bohr Institute (NBI) at the University of Copenhagen has expertise in EFT applied to high energy particle physics phenomenology. The NBIA is a dynamic sub-group within UCPH that the node coordinator is a part of. NBIA is committed to fostering the traditions of internationalism and interdisciplinarity excellence in physics, which also characterizes the Niels Bohr Institute.
Role and Commitment of key persons (including supervisors)	**Prof. Michael R. Trott** (50% node coordinator, research and supervision), **Prof. P. H. Damgaard** (20%, research and training support)
Key Research Facilities, Infrastructure and Equipment	UCPH is a public university with outstanding infrastructure to recruit, host and train early stage researchers and visitors involved in the network. The NBIA has 27 senior+junior staff members, 19 postdoctoral fellows and 9 ongoing Ph.D. students. A total of 8 Ph.D theses on particle physics have been successfully defended by the team members.
Status of Research Premises	All UCPH research facilities are owned by UCPH and are independent from the other members of the consortium.
Previous Involvement in Research and Training Programmes	Excellent track record of attracting Danish postdoc grants in NBIA (DFF-postdoc) in recent years (including S. Badger, R. Monteiro, D. O. Connell, S. Caron-Huot, T. Dennen, G. Festuccia, W. Shepherd). Funding from the European Unions Horizon 2020 research and innovation programme for Marie Sklodowska-Curie grant agreement No 660876, HIGGS-BSM-EFT was held in the past by M. Trott.
Current Involvement in Research and Training Programmes	Danish Basic Research Grant (Discovery Center DNRF91 at NBI) - Discovery members M. Trott, P. Damgaard. Current beneficiary of several Danish national grants (DFF-project grant) (M. Trott). Current beneficiary of National Private grants (Villum Outstanding Junior Investigator - M. Trott).
Relevant Publications and/or Research / Innovation Product	– R. Alonso, E.E.Jenkins, A.Manohar and M. Trott, RGE of the Standard Model Dimension Six Operators III: Gauge Coupling Dependence and Phenomenology, JHEP 1404 (2014) 159, arXiv:1312.2014; – E.E.Jenkins, A.Manohar and M. Trott, RGE of the Standard Model Dimension Six Operators II: Yukawa Dependence, JHEP 1401 (2014) 035, arXiv:1310.4838; – E.E.Jenkins, A.Manohar and M. Trott, RGE of the Standard Model Dimension Six Operators I: Formalism and lambda Dependence, JHEP 1310 (2013) 087, arXiv:1308.2627; – C. Hartmann and M. Trott, Higgs Decay to Two Photons at One Loop in the Standard Model Effective Field Theory, Phys. Rev. Lett. 115 (2015) 19, 191801, arXiv:1507.03568; – C. Hartmann, W. Shepherd and M. Trott, The Z decay width in the SMEFT: yt and corrections at one loop, JHEP 1703 (2017) 060, arXiv:1611.09879.

Beneficiary Legal Name: Deutsches Elektronen-Synchrotron (DESY)	
PIC: 999986969	
General Description	DESY is one of the world's leading accelerator centres. Researchers use the large-scale facilities at DESY to explore the microcosm in all its variety. DESY has about 2300 employees, and hosts about 3000 guest scientists from over 40 countries each year. More than 700 diploma students, doctoral candidates and postdocs perform research in the DESY groups. More than 100 young people are trained in commercial and technical vocations. DESY makes crucial contributions to several particle physics experiments, including the ATLAS and CMS experiments at the LHC at CERN in Geneva. The groups support the full life-cycle of the experiments from detector development, construction and operation to data calibration, analysis and interpretation. DESY has a very strong theory group. DESY hosts a large Tier-2 computing facility for LHC data as well as the National Analysis Facility (NAF). The CMS group at DESY pursues measurements, searches and data interpretation in the areas of Higgs Bosons, precision analyses of standard model processes as well as searches for new physics. The group plays a leading role in the study of top quark processes, and has pioneered measurements of differential top-quark pair cross sections, measurements of the top quark mass and the direct observation of Higgs boson production in association with top quarks.
Role and Commitment of key persons (including supervisors)	**PD Dr. Andreas Meyer** is a senior Scientist at DESY since 2005, with interim stays as Scientific Associate at CERN (2007-09 and (2014-15) and professor at Karlsruhe Institute of Technology (2016-17). Dr. Meyer has supervised and/or refereed more than 30 Ph.D. theses. He was convenor of the CMS top quark working group (2014-15). He currently serves as CMS representative in the steering committee of the Workshop on Physics at the High-Luminosity LHC and High-Energy LHC. Dr. Meyer co-leads the CMS DESY effort on top quark analysis and will commit 25% of his time to supervise the Ph.D student to be hired, and to coordinate the interproject-activities (WP5). The hired student will interact with several senior scientists, postdocs and students working on related topics. **Prof. Dr. Elisabetta Gallo**, DESY CMS group leader, is Professor at Hamburg University and serves as co-supervisor (legal link).
Key Research Facilities, Infrastructure and Equipment	The CMS group at DESY consists of more than 80 scientists, postdoctoral researchers and students of which more than 25 are doctoral students enrolled at Hamburg University or another degree-awarding institution. DESY will provide office space, computing facilities. Students at DESY regularly attend lectures, seminars and training events, some of which are organized through the Terascale-Alliance or the PIER-Helmholtz Graduate School)
Status of Research Premises	DESY is an organization within the Helmholtz Association. It operates independently on its premises since 1959. All research facilities necessary for the proposed project are owned by DESY.
Previous Involvement in Research and Training Programme	DESY has been involved in 41 completed FP7 projects, 11 of these where MC activities. Among them DESY coordinated the MCA-ITN GATIS (317089) and was beneficiary at the MCA- ITNs HiggsTools (316704), PicoSEC-MCNet (289355), LHC-PhenoNet (264564), ATTOFEL (238362), MC-PAD (214560) and DITANET (215080). DESY was involved in national third party funding and host specific training programs.
Current Involvement in Research and Training Programmes	DESY is currently involved in 44 Horizon 2020 projects and 2 ongoing FP7 projects. Among them DESY is beneficiary of the MSCA-ETNs MEDEA (641789) and SAGEX (764850) associated partner of the MSCA-EJDs HPC-LEAP (642069) and STIMULATE (765048) as well as beneficiary of the MSCA-RISE actions E-JADE (645479), and JENNIFER (644294). DESY hosts the ERC Starting Grant HiggspT (678215). Beside DESY has a joint PIER graduate school with Hamburg University.
Relevant Publications and/or Research / Innovation Product	- Phys. Rev. Lett. 120, (2018) 231801, arXiv:1804.02610. - Phys. Rev. Lett. 121 (2018) 121801, arXiv:1808.08242. - EPJC 77 (2017) 459, arXiv:1703.01630. - arXiv:1811.06625 (subm. to JHEP). - arXiv:1812.10505 (subm. to EPJC).

Beneficiary Legal Name: University of Coimbra (UC)	
PIC: 997826391	
General Description	The University of Coimbra (UC), Portugal, was created in 1290 and is comprised of ten organic units of teaching and research (eight faculties: Arts and Humanities, Law, Medicine, Science and Technology, Pharmacy, Economics, Psychology and Educational Sciences, Sport Sciences and Education Physics, as well as the Institute for Interdisciplinary Research and the College of Arts; and two research units: European Judicial University Court and Institute of Nuclear Sciences Applied to Health). UC also comprises a set of academic extension structure units such as the Botanical Garden, the General Library, the Archive of the University, the University's Press, the Science Museum, the April 25 Documentation Center, the Gil Vicente's Academic Theatre, the Social Services of the University of Coimbra, the University Stadium, the Health Sciences' Library, the Geophysical Institute, the Natural History Museum and the Astronomical Observatory. These structures are distributed by three centers. The main activities of the UC are teaching, research and knowledge transfer.
Role and Commitment of key persons (including supervisors)	**Dr. Orlando Oliveira** (20% scientist in charge, research and supervision)
Key Research Facilities, Infrastructure and Equipment	The University of Coimbra guarantees excellent working conditions, including office space, equipment, computers and consumables. The ESR will be also granted full access to all required facilities and services (libraries, phones, administrative support, internet access - including email address from the institution). The University of Coimbra has a specialized service to support student and researchers international mobility: the Postgraduate Mobility Centre (http://www.uc.pt/en/cmpg), which is member of the EURAXESS, the European Network of Services to support researchers' mobility created in June 2004 by the European Commission. This service will provide assistance to the ESR in all matters relating to professional and daily life, including information on visa, residence permit conditions and related legal issues, social security and taxes, health, accommodation, everyday life and family support. The administrative and financial procedures regarding project implementation will be run in the Project Management Office of UC's Administration that will assign a competent member of the staff to this project (in partial time). This Office has all the needed accountable and legal competencies for these tasks.
Status of Research Premises	Yes (Owned).
Previous Involvement in Research and Training Programmes	The University of Coimbra holds a vast expertise in training and research. The University currently offers 71 PhD programs and, in 2017, had 278 research projects ongoing, including several under Marie Curie Schemes (ITN, IAPP and IRSES). Past Marie Curie actions coordinated by the University of Coimbra include projects n.º 264710- MANANO; PITN-GA-2013-604825 ECOFLOC; PIRSES-GA-2013-612569 – DEVASSES; PCIG11-GA-2012-321909 – ReproWeed and PCIG11-GA-2012-321794 SEEDS. The University was also involved in other projects as beneficiary, such as BIBAFOODS [PITN-GA-2013-606713], QUICS [[PITN-GA-2013-607000-QUICS], SMARTCANCERSENS [PIRSES-GA-2012-318053] and EUINDEPTH [PIRSES-GA-2013- 612619].
Current Involvement in Research and Training Programmes	The University of Coimbra is currently involved in the following Marie Curie projects: 708492 — TMS_ATT (Coordinator/Marie Curie IF) 746304 — Spor-oikos (Coordinator/Marie Curie IF) 765866 – ACHIEVE (Beneficiary/Marie Curie ITN-ETN) 643167 - AEOLUS4FUTURE (Beneficiary/Marie Curie ITN-ETN) 764837- POLYTHEA (Beneficiary/Marie Curie ITN-EJD) 777657 – PREMIUM (Beneficiary/Marie Curie RISE) 777803 – GYPWORLD (Beneficiary/Marie Curie RISE) 823788 – ADVANCE (Beneficiary/Marie Curie RISE)
Relevant Publications and/or Research / Innovation Product	Braz. J. Phys. 46 (2016) 6, 721, arXiv:1508.01049. EPJC 71 (2011) 1555, arXiv:1102.4455. Phys. Rev. D 79 (2009) 014006, arXiv:0811.1743. EPJC 50 (2007) 507, arXiv:0704.0594.

Beneficiary Legal Name: Comenius University in Bratislava	
PIC: 999841566	
General Description	The Comenius University in Bratislava is the largest university in Slovakia with about 26,000 students - among them almost 3,000 international students from more than 70 countries. Since its founding the University has ranked among the best educational institution on the national level and it has become an internationally recognised centre of scientific study and research with strong educational and research activities in the natural sciences. The research in the field of elementary particle physics and development of particle physics detectors is carried out at Faculty of Mathematics, Physics and Informatics, at Department of Nuclear Physics and Biophysics. The department has a long tradition in the particle physics that has been studied in cooperation with big world particle physics centres: JINR Dubna (experiment Hyperon), Fermilab, Batavia (experiments E771 and CDF) and CERN (experiments Delphi, ATLAS, ALICE, Isolde). The fellows of department are internationally well established in this field and can contribute effectively to the particle physics research and to the training of young scientists.
Role and Commitment of key persons (including supervisors)	**Prof. Stanislav Tokar:** lecturer and researcher at Comenius University since 1993; the Head of Department of Nuclear Physics and Biophysics and the leader of Bratislava/ATLAS group. He was convener of the top-quark properties group of ATLAS (2007-8). He was awarded with the price "Scientist of year" in Slovakia for the year 2013. Prof. Tokar leads analyses on top-quark physics tasks within the ATLAS and CDF, supervise students – at present 4 PhD students, 11 PhD students successfully defended their theses, 15 undergraduate students with successfully defended diploma works. Assoc. Prof. Pavol Bartoš: lecturer and researcher at Comenius University since 2011. He is involved in top-quark and high pT physics studies in the experiments ATLAS and CDF.
Key Research Facilities, Infrastructure and Equipment	The particle physics group including PhD students counts about 40 researchers. The University can provide for the ITN participants an office space, computing facilities – a local particle physics cluster as well as the students can be provided with access to a Tier 2 GRID located at the Faculty of Mathematics, Physics and Informatics. In addition, at the Department of Nuclear physics and Biophysics are available laboratory facilities for hardware development and the ITN students will be integrated into the group with possibilities to attend lectures, seminars and other educational events.
Status of Research Premises	The Comenius University is a public university with independent research premises own by the university.
Previous Involvement in Research and Training Programmes	The Comenius University has actively participated in Marie Curie Research Training Networks and Innovative Training Networks. The track record of finished project contains 12 projects (Acronym, proj.No.): ELDEL, 215961; ALGGENOMES, 224885; BIOSEQANALYSIS, 231025; NLAMATHMODELS, 239429; QUEST, 238007; CONAN, 268352; META, 269182; STRIKE, 304617; ALErT, 607996; Meiosis2012, 322300; EPiCSTENT, 324514; WOGYMARKET626128.
Current Involvement in Research and Training Programmes	At present the Comenius U participates in 3 projects (Acronym, proj. No.): IMPACT, 674911; FORMILK, 690898; TWOSENS, 752285.
Relevant Publications and/or Research / Innovation Product	- JHEP 11 (2013) 031, arXiv:1307.4568; - Phys. Rev. D 88 (2013) 032003, arXiv:1304.4141; - EPJC 75 (2015) 466, arXiv:1502.07947; - Prog. Part. Nucl. Phys. 93 (2017) 108, arXiv:1612.01351; - EPJC 78 (2018) 129, arXiv:1709.04207.

Partner Organisation Legal Name: European Organization for Nuclear Research (CERN)	
General description	CERN is the world's largest particle physics centre, providing advanced facilities for particle physics. Close to 13,000 scientists from 650 institutes worldwide are involved in the research and technology programme. CERN's mission is focused on research, technology, collaboration and education, including a long and strong training tradition. It has its own Learning and Development service providing almost 14,000 person days of technical management, communication, academic, safety and language training per year. CERN can host meetings and schools and provide access to expertise that is used in the ATLAS and CMS collaborations for data analysis as well as its academic programmes.
Key Persons and Expertise	**Prof. André David** (20%, research and training support), former CMS Higgs convener, former CMS Higgs combination and properties convener, former LHC Higgs XSWG properties convener. Assisted by members of the beneficiary institutions stationed at CERN.
Key Research Facilities, Infrastructure and Equipment	World-class accelerator facilities, esp. the LHC. In-house engineering/technology/detector physics groups. Due to its position as a focal point for research into elementary particle physics and associated technologies, CERN is graced with state-of-the-art technological infrastructure and equipment. This spans a very large range of facilities such as accelerators and particle detectors, a forefront informatics backbone including Grid computing developments.
Previous and Current Involvement in Research and Training Programmes	(abridged) FP6: Coordinator of 7 EST, 1 RTN + partner in 2 RTNs FP7: Coordinator of 11 ITNs + partner in 8 others H2020: Coordinator of 4 ITNs, beneficiary or partner organization in 7 others
Relevant Publications and/or Research / Innovation Product	- ATLAS and CMS Coll., "Measurements of the Higgs boson production and decay rates and constraints on its couplings from a combined ATLAS and CMS analysis of the LHC pp collision data at $\sqrt{s}$ = 7 and 8 TeV," JHEP 08 (2016) 045, arXiv:1606.02266; - A. David and G. Passarino, "Through precision straits to next standard model heights," Rev. Phys. 1 (2016) 13, arXiv:1510.00414; - A. David, J. Heikkilä, and G. Petrucciani, "Searching for degenerate Higgs bosons," EPJC 75 (2015) 49, arXiv:1409.6132;

Partner Organisation Legal Name: Università di Torino, (UNITO) Italy	
General description	Torino unit is renowned for activities in collider physics, including higher order EW/QCD calculations, effective field theory for Higgs physics, computer algebra, resummations.
Key Persons and Expertise	**Prof. Giampiero Passarino** (40%, research and supervision) **Prof. Sandro Uccirati** (30%, research and training support) **Dr. Chiara Mariotti** (20%, research and training support)
Key Research Facilities, Infrastructure and Equipment	The Physics Department hosts approximately 150 staff members, plus a sizable number of post-docs. Torino has a proud tradition in physics, with a strong group in collider phenomenology, one of the leading groups devoted to astro-particle physics, and a renowned group in string theory. Together, these groups provide an ideal intellectual environment to train young researchers.
Previous and Current Involvement in Research and Training Programmes	Torino was a Full Partner in the FP6 program Heptools. Prof. Passarino has been scientist in charge for 6 Prin projects (Programmi di Ricerca Scientifica di Rilevante Interesse Nazionale) where Torino was a node. Torino was a Full Partner in the FP7 Initial Training Network, HiggsTools, The Higgs quest - exploring electroweak symmetry breaking at the LHC, PITN-GA-2012-31670 and the Vector Boson Scattering, COST Action CA16108.
Relevant Publications and/or Research / Innovation Product	– C. Mariotti, G. Passarino, "Higgs boson couplings: measurements and theoretical interpretation", Int. J. Mod. Phys. A 32 (2017) 1730003, arXiv:1612.00269. – G. Passarino, "Field reparametrization in effective field theories", Eur. Phys. J. Plus 132 (2017) 16, arXiv:1610.09618. – M. Boggia, R. Gomez-Ambrosio, G. Passarino, "Low energy behaviour of standard model extensions", JHEP 1605 (2016) 162, arXiv:1603.03660.

Partner Organisation Legal Name: Heidelberg University, (UHeid) Germany	
General description	The Institute of Theoretical Physics at the University of Heidelberg is one of the largest physics departments in Germany with long-standing tradition in the training of young scientists, and a world leading research center with an average citation number of about 10000 per senior staff. It hosts several research groups with leading expertise, in particular, in LHC phenomenology, Higgs boson and top quark physics, Effective Field Theories and statistical analysis. Existing collaborations: UAM, KIT, UDUR, CERN.
Key Persons and Expertise	**Dr. Ilaria Brivio** (scientist in charge); expertise in LHC phenomenology and particularly Effective Field Theories, author of the SMEFTsim package.
Key Research Facilities, Infrastructure and Equipment	The University of Heidelberg offers an outstanding research environment, with leading experts in several areas of theoretical particle physics. This is reinforced by close collaboration with the Max Planck Research centers, in particular with the Max Planck Institute for nuclear physics. Heidelberg also participates in initiatives dedicated to the training of graduate students, such as the Heidelberg Graduate School of Fundamental Physics (HGSFP) and the "Graduate days", organized twice a year, that provide lectures on a wide range of research topics in particle physics, as well as on complementary subjects and industry.
Previous and Current Involvement in Research and Training Programmes	The Institute of Theoretical Physics currently hosts ~50 PhD students. It participates in the Masters program in physics of the University of Heidelberg, and hosts the doctoral training center (Graduiertenkolleg) "Particle Physics Beyond the Standard Model" and the International Max Planck Research School "Precision Tests of Fundamental Physics". It also participates in the ITN "Elusives" (H2020-MSCA-ITN-2015 / /674896-ELUSIVES)
Relevant Publications and/or Research / Innovation Product	- A. Butter et al "The gauge-Higgs legacy of the LHC Run I". JHEP 1712 (2017) 070, arXiv: 1604.03105. - I. Brivio, M. Trott, "The Standard Model as an Effective Field Theory", accepted in Physics Reports, arXiv:1706.08945. - I. Brivio, Y. Jiang, M. Trott, "The SMEFTsim package, theory and tools". JHEP 1712 (2017) 070, arXiv: 1709.06492.

Partner Organisation Legal Name: Universidad Autonoma de Madrid (UAM), Spain	
General description	The Institute for Theoretical Physics (IFT) UAM-CSIC was officially created in 2003 as a joint research center belonging to the Spanish National Research Council (CSIC) and the Autonomous University of Madrid (UAM). It is the only Spanish center entirely dedicated to research in Theoretical Physics. The IFT members develop research at the frontiers of Elementary Particle Physics, Astroparticles, and Cosmology, in order to understand the fundamental keys of Nature and the Universe. They are also leading many research projects, both at the national and international level. The IFT is part of the strategic line `Theoretical Physics and Mathematics´ of the Campus of International Excellence (CEI) that UAM+CSIC established in 2009. Since 2012, it is credited as a Severo Ochoa Centre of Excellence. Besides purely scientific activity, IFT also conducts intensive training tasks of young researchers and professionals through the graduate program in Theoretical Physics with mention of excellence from the CEI and the Ministry of Education. In addition, the Institute carries out the important task of transferring knowledge to society through several outreach programs.
Key Persons and Expertise	**Prof. Juan Antonio Aguilar Saavedra** (scientist in charge): Full Professor with expertise on theoretical particle physics and phenomenology and a member of the ATLAS Collaboration at CERN. Excluding the ATLAS publications, he has published 87 publications in peer-reviewed journals, with 5700 citations. Has been involved in several projects related to the LHC phenomenology and is the author of TopFit.
Key Research Facilities, Infrastructure and Equipment	The IFT has a large infrastructure of high-performance scientific computing. Its main computational resource is the Hydra HPC cluster. It also has a rich ecosystem of secondary processing systems and data analysis, symbolic computation, and high-performance storage. The IFT has also a large infrastructure of IT systems for service and support to scientific activities, including: Web and application servers, cloud storage, video streaming and recording service, virtualization, etc, as well as several management applications developments. The building houses several general-purpose conference rooms.
Previous and Current Involvement in Research and Training Programmes	European Union: ITN Network, Elusives, H2020-Marie Skłodowska-Curie-ITN-2015, 2016-20; RISE, InvisiblesPlus, H2020-Marie Skłodowska-Curie-ITN-2015, 2016-20; ERC Advanced Grant, String Phenomenology in the LHC Era (SPLE), SPLE-ERC-2012-ADG-20120216, 2013-17; ERC Advanced Grant, UV-completion through Bose-Einstein condensation: A quantum model of black holes (SELFCOMPLETION), SELFCOMPLETION-EU210353-01-FP7-ERC-2013-ADG-010168, 2014-18; ITN Network, Neutrino Physics and the Dark Universe (invisibles) FP7-PEOPLE-2011-ITN, PITN-GA-2011-289442, 2012-16; Marie Curie Career Integration Grant, Neuprobes, PCIG11-GA-2012-321582.
Relevant Publications and/or Research / Innovation Product	- J. A. Aguilar-Saavedra, "Dilepton azimuthal correlations in tt production", JHEP 09 (2018) 116, arXiv: 1806.07438; - J. A. Aguilar-Saavedra, "Running bumps from stealth bosons", EPJC 78 (2018) 206, arXiv:1801.08129; - J. A. Aguilar-Saavedra, "Single lepton charge asymmetries in tt and tt+γ production at the LHC", EPJC 78 (2018) 434, arXiv:1802.05721.

Partner Organisation Legal Name: Bosch Car Multimédia Portugal, S.A.	
General description	Bosch Braga, as part of the Car Multimedia division of Bosch, has developed a strong vision of the car of the future, including many opportunities for new products. Always on the cutting edge of innovation, at Bosch Braga we think it is imperative to look out for new technology, creating competitive and innovative market solutions. Bosch Car Multimedia Portugal, S.A. is a production plant and a Research & Development Centre of complex electronic systems. Currently, the plant produces a wide portfolio that spans navigation systems, instrumentation systems and high end car radios for the automotive industry, steering angle sensors for ESP systems, electronic controllers for heating equipment, and controllers for household appliances
Key Persons and Expertise	**Eng. Sofia Abreu** acts as the key person from Bosch associated to the LHCnet proposal and activities. She has been involved in the development of the AOI systems already used in the production lines (2I20 and 2I25), has monitored their design, integration, and performance at the production lines. As senior engineer, she has also acted as supervisor of the students enrolled in the "Optical Bonding" CA, helping to define a detailed work plan, with clear milestones and goals.
Key Research Facilities, Infrastructure and Equipment	Bosch has in Braga a large plant which houses several production lines, associated to the car industry. In addition to the plants in place, Bosch has opened a new technology centre R&D Centre that will house 200 highly qualified human resources by the end of 2019, working on the development of sensors and software functions for automated driving.
Previous and Current Involvement in Research and Training Programmes	Bosch Car Multimedia and the University of Minho have a partnership for Research & Development. Since July 2013 and until June 2018, Bosch and University of Minho have invested 74,7 million euros: HMIExcel – Human Machine Interface Excellence (from July 2013 to June 2015) and Innovative Car HMI (from July 2015 to June 2018). This last collaboration has two areas: iFACTORY (for processes) and INNOVCAR (for products). These projects involve 855 associates and researchers (362 are new associates) increasing the involvement with universities in order to get critical knowledge for Bosch Car Multimedia and University of Minho.
Relevant Publications and/or Research / Innovation Product	Production of innovative solutions and technologies for the global market of Car Multimedia products.

6. Ethics Issues

No ethical issues were identified in the proposal.

7. Letters of Commitment

Letters of Commitment from the partner organizations of LHCnet network are attached.

European Organization for Nuclear Research
Organisation européenne pour la recherche nucléaire

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CH-1211 GENEVA 23

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Email: Manfred.Krammer@cern.ch

Prof. António Onofre
University of Minho
Portugal

Our reference: MSCA-ITN-LHCnet

Geneva, December 21, 2018

Subject: Letter of commitment for the Marie Skłodowska-Curie action ITN "LHCnet"

I hereby certify that the European Organisation for Nuclear Research (CERN) intends to participate as partner in the Marie Skłodowska-Curie Innovative Training Network **LHCnet**, proposed to the call H2020-MSCA-ITN-2019.

CERN is highly interested to support the training and research in the **LHCnet** proposal as we see significant potential to the advancement of a global interpretation of experimental particle physics data from the LHC.

Recognizing the importance of the proposal, we hereby confirm our commitment to support the activities in the **LHCnet** proposal through the following measures;

- CERN will offer the possibility to host secondments and/or visits from the ESRs in the network, for periods of 4 weeks up to 6 months each.
- CERN will provide to the seconded and/or visiting ESR training in data analysis, including statistical methods and evaluation of systematic effects in view of a SMEFT interpretation from a combined simultaneous analysis of top-quark and Higgs data from ATLAS and CMS.
- CERN will participate as a member of the supervisory board to the **LHCnet,** actively shaping the training plan given its role as a training platform for the network.

CERN looks forward to participating in this Marie Skłodowska-Curie Innovative Training Network.

It is understood that the relevant costs incurred by CERN related to the implementation of secondments and visits will be reimbursed by the corresponding beneficiaries of the **LHCnet** network within the foreseen limits of H2020 EU rules. For this purpose, CERN shall invoice the related costs to the appropriate network partner/beneficiary.

Manfred Krammer
Head of EP Department - CERN

home.cern

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Prof. Antonio Onofre
Department of Physics
Universidade do MINHO
PORTUGAL

Dear Colleague,

this letter confirms that the Department od Physics, Torino University, agrees to participate as a Partner Organisation in the proposed Innovative Training Network (ITN) "LHC net".
The members of the Theoretical Particle Physics group are experts in particle phenomenology with focus on precision physics, Higgs physics, QCD and physics of electroweak gauge bosons at particle colliders including the design of new techniques for the automatized calculation of higher-order corrections, the construction of Monte Carlo generators and the development of Standard Model Effective Field Theory at next-to-leading order.
We are experienced in the training of young researchers, and have participated in several research and training networks including the FP6 HEPTOOLS Research and Training Network.
We therefore strongly support the LHC net proposal. One of our representatives contribute to the design and implementation of the training program. We will host secondments of ESRs and provide research training in aspects of SMEFT for LHC processes.

Yours sincerely,

Director of the Department
Prof. Ermanno Vercellin

Dipartimento di Fisica
dell'Università degli Studi di Torino
Il Direttore di Dipartimento
Prof. Ermanno Vercellin

V. Pietro Giuria 1 – 10125 TORINO Tel. 011/670.7260/7429 e-mail: direzione.fisica@unito.it pec: fisica@pec.unito.it

INSTITUT FÜR THEORETISCHE PHYSIK

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Institute for Theoretical Physics, Philosophenweg 16, 69120 Heidelberg

Prof. Antonio Onofre
Department of Physics
University of Minho
Portugal

Heidelberg, 2019-01-14
Letter of commitment

Prof. Dr. Christof Wetterich
Institute for Theoretical Physics
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c.wetterich@thphys.uni-heidelberg.de

Dear Professor Onofore,

This letter certifies that the Institute of Theoretical Physics, Heidelberg University, intends to participate as Partner Organisation in the Maria Skłodowska-Curie Innovative Training Network "LHCnet", proposed to the call H2020-MSCA-ITN-2019.

The Institute has a long-standing experience in the training of young scientists and hosts several research groups. We have leading expertise in LHC phenomenology, Higgs, electroweak and top quark physics and SMEFT, as well as statistics and fitting technology. We are involved both in the theoretical development of these areas and in the design of various automated tools for their exploration.

We strongly support the activities of LHCnet and intend to contribute by hosting secondments of ESR. The University of Heidelberg will provide training and support mainly concerning the theoretical aspects of the SMEFT formalism, the usage of the SMEFTsim package and the interpretation of fit results.

Yours sincerely,

Christof Wetterich
(Managing Director)

Universität Heidelberg
Fakultät für Physik und Astronomie
Institut für Theoretische Physik

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Cincuenta Aniversario 1968 2018

UAM Universidad Autónoma de Madrid

Letter of Commitment

This letter confirms our support and commitment to participate in the European training network entitled: "The LHC network" (LHCnet) to be submitted in response to the call H2020-MSCA-ITN-2019, Marie Skłodowska-Curie Actions, European Training Network (ETN) within Horizon 2020 program.

Summary information about the organization

Universidad Autónoma de Madrid is a state university offering graduate and postgraduate degrees in many different fields. It is a young university -founded only 50 years ago- but has already achieved an outstanding international reputation for its high-quality teaching and research. It is generally recognized as one of the best Spanish universities in both national and international rankings 11th worldwide position in the QS University Rankings: Top 50 Under 50. UAM is a modern and democratic institution in which decisions are taken with the participation of all the members of the community, and which is characterised by its strong social commitment and participation in society.

Summary information about the role of our team in the proposed project

The contribution from the team members on the theory of top quark, Higgs and EW physics is internationally recognized and we can contribute to the project as partners that can provide training, research activities and secondments, in aspects of the LHCnet related to theory developments in top quark, Higgs boson and electroweak physics, in collaboration with all the partners of the network.

Yours faithfully,

UNIVERSIDAD AUTÓNOMA DE MADRID - Vicerrectorado de Investigación -

Jose Manuel González Sancho
Vice rector for Research
11th January 2019

Universidad Autónoma de Madrid / Ciudad Universitaria de Cantoblanco · 28049 Madrid

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sofia.abreu@pt.bosch.com

14. January 2019

This declaration confirms our interest and support on the planned activities in the European training network entitled: "The LHC network" (LHCnet). We are specifically interested in the activities related to Work Package 4 (WP4), i.e., **"The LHCnet Hardware and Image Processing"**, with the main objective to design next generation systems for Image Acquisition and Processing, using Machine Learning software tools for pattern and image reconstruction.

Since 2016, Bosch Car Multimedia, S.A., and the University of Minho have established a Cooperation Protocol (iSci-Bosch-ECUM) that defines the concept of "Collaborative Activity", which allows a knowledge transfer between the academic and the industrial world. Under the Protocol, the Collaborative Activity labelled "Optical Bonding" is defined, and two prototypes were developed and installed in the production lines with the ambitious plan of identifying and characterizing the products manufactured and, reduce the losses at the production lines.

The possibility of using new and better tools, foreseen to be developed in the WP4 of LHCnet project, based on Machine Learning software techniques to improve the performance of the installed devices in the production lines, is seen as value added to the project. We therefor support the possibility of testing these new techniques in our production lines, by either completing the on-going Collaborative Activity or developing new collaboration Activities, as judged appropriate, under the signed Cooperation Protocol (iSci-Bosch-ECUM).

Mit freundlichen Grüßen

Bosch Car Multimédia Portugal, S.A.
Sofia Abreu
Sofia Alexandra Chaves Abreu 14/01/19

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14. January 2019

Bosch Braga, as part of the Car Multimedia division of Bosch, has developed a strong vision of the car of the future, containing many opportunities for new products. Always on the verge of innovation, at Bosch Braga we think it is imperative looking out for new technology, creating competitive and innovative market solutions.

Bosch Car Multimedia Portugal, S.A. is a production plant and Research & Development Centre of complex electronic systems. Currently, the plant produces a wide portfolio that spans across navigation systems, instrumentation systems and highend car radios for the automotive industry, steering angle sensors for ESP-system, electronic controllers for heating equipment, and controllers for household appliances.

In order to develop new and important competences, Bosch Car Multimedia and the University of Minho established a unique partnership in the field of Research & Development. This partnership has proven to be of great mutual benefit, delivering valuable technological insights at low cost through the effective use of 3rd party funding. Since July 2013 until June 2018, Bosch and University of Minho are investing 74,7 million euros: HMIExcel – Human Machine Interface Excellence (from July 2013 to June 2015) and Innovative Car HMI (from July 2015 to June 2018). This last one has two areas: iFACTORY (for processes) and INNOVCAR (for products). These projects involve 855 associates and researchers (362 are new associates) increasing the involvement with universities in order to get critical knowledge for Bosch Car Multimedia and University of Minho.

Innovation, critical knowledge and excellence are the key pillars with the highest strategic impact for the journey of Bosch Car Multimedia Portugal, S.A. towards the future.

The culture of innovation and continuous improvement was then set as a priority and today is strongly embedded in the organisation. Innovation, critical knowledge and excellence are the key pillars with the highest strategic impact for the journey of Bosch Car Multimedia Portugal, S.A. towards the future.

Mit freundlichen Grüßen

Bosch Car Multimédia Portugal, S.A.
Sofia Abreu

END PAGE

MARIE Skłodowska-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2019

PART B

"LHCnet"

This proposal is to be evaluated as:

ETN