

AIDA 2020

Advanced European Infrastructures
for Detectors at Accelerators

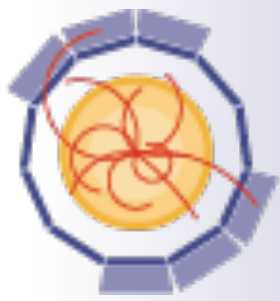
The future “AIDA++” program

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INFN Bologna

CERN, April 29, 2019



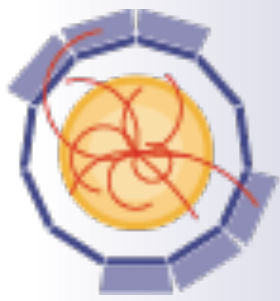
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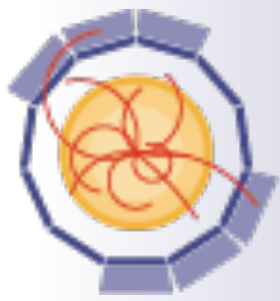
AIDA²⁰²⁰

AIDA-2020

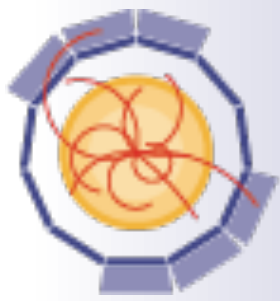
- **AIDA-2020** is a program financed by the EU under the INFRAIA call with **10 M€**
 - It is co-financed (mainly with the salaries of the employees of the partner institutes) by the participating institutes with **19 M€**, for a total program value of **29 M€**
- There are 38 participating institutes with a total of ~400 researchers
- The program was originally financed for 4 years from May 2015 to end of April 2019.
 - Last year we successfully asked for an extension of one year, at zero cost by the EU, until the end of April 2020.
- AIDA-2020 is the third project of this “series” that has been financed by the EU: previously there were EUDET and AIDA, both 4 years long.



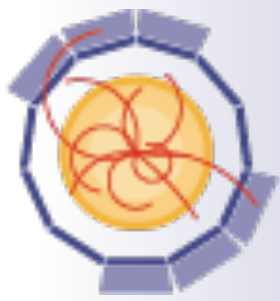
- Informal information from meeting at Brussels on March 5
- FP8 Call 5: Large initiatives and support measures to **foster the innovation potential of research infrastructures**:
 - New directions in EC funding instruments, addressing established communities
 - Following consultations with communities to prepare for FP9
 - To be published in summer
- INFRAINNOV-03-2020 - Co-Innovation platform for research infrastructure technologies (2020 – zz M€)
 - This is where ATTRACT phase 2 will be
- INFRAINNOV-04-2020 - **Innovation pilots** (2020 – xx M€, max yy M€ each)
 - Innovation in light source technologies
 - **Innovation in detector technologies**
 - Innovation in accelerator technologies
- **Deadline March 17, 2020**



- **Proposal submission deadline March 17, 2020**
 - Call will be published in July
 - Alignment with European Strategy Process will be challenging
- CERN taking the lead and will ensure administrative support
 - Research Director nominated proposal coordinator (F. Sefkow)
- **Call for Expressions of Interest in May, deadline end of June**
 - sub-community discussions should be prepared
- Foresee scrutiny of Eols by rapporteurs
- **Open community meeting early September:** tentatively Sept 4 (or 6)
- Formation of Proposal preparation team
- Submission in march, evaluation in June
 - Start of new project end of 2020 possible

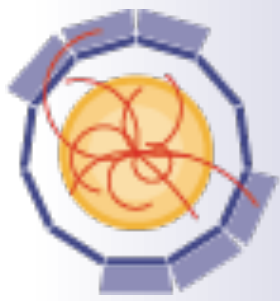


- Objective:
- Support RI* networks developing and implementing a **common strategy/roadmap including** technological development required for improving their services through **partnership with industry**;
- Support **incremental innovation** and cooperation with **industry and academia** in areas such as scientific instrumentation
- Target:
- **Advanced Integrated Activities****, which have reached a high level of integration and can **focus on joint** research developments
- * RI – Research Infrastructure
- ** e.g. AIDA-2020



- Development of **roadmap**/strategic agenda for the construction and upgrade of RI
- Development of **technologies & techniques underpinning** the use of the RI
- **Prototyping** corresponding methodologies & instrumentation
- Early stage involvement of **industry as beneficiary** and supplier
- **Sustainability** plan requested (co-funding of roadmap)
- **Complementarities** between the two innovation actions required

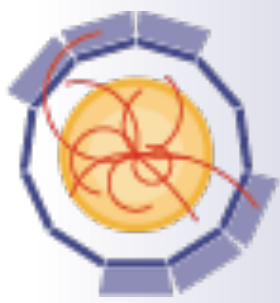
- **Tools:** Joint Research Activity (JRA), Networking Activity (NA) - but **no TA (Transnational Access)**
- Proof of Concept (competitive allocation after start of project) possible, e.g. for low TRL, higher risk projects (“blue sky”)



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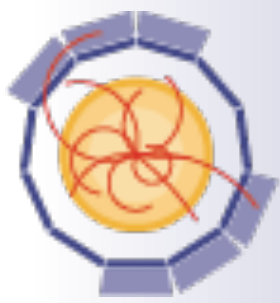
AIDA-2020 work packages

- **WP2:** Innovation and outreach
- **WP3:** Advanced software
- **WP4:** Micro-electronics and interconnections
- **WP5:** Data acquisition systems for beam tests
- **WP6:** Novel high voltage and resistive CMOS sensors
- **WP7:** Advanced hybrid pixel detector
- **WP8:** Large scale cryogenic liquid detectors (neutrino expts.)
- **WP9:** New support structures and micro-channel cooling
- WP10: Beam test facilities
- WP11: Irradiation test facilities
- WP12: Detector characterisation facilities
- **WP13:** Innovative gas detectors
- **WP14:** Infrastructure for advanced calorimeters
- WP15: Upgrade of beam and irradiation test infrastructure

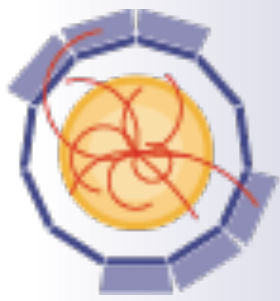


- Scope, communities
 - main targets **future colliders** and accelerators-based neutrino experiments
 - other non-collider projects, e.g. SHIP, non-accelerator projects, e.g. axion and DM search, astro-particle physics?
- New Topics
- Replacing TA
- Integration vs Innovation
- Sustainability – now and then
- Industry involvement
- Roadmap
 - intermediate goals; items missing on CERN map
- Balance with CERN R&D program
 - cooperation and complementarity
- PoC (for blue sky projects)

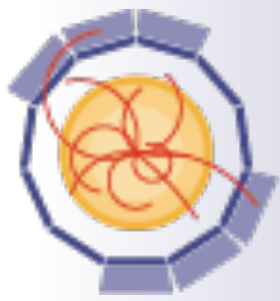
- HL-LHC upgrades now moving to production
 - R&D largely done - will not guide AIDA++
- New in AIDA-2020 – could be expanded
 - Precision mechanics and CO₂ micro-cooling
 - Large cryogenic detectors
- Future hadron colliders
 - Fast timing for pile-up rejection increasingly important
 - Sensors, electronics and test infrastructures, beam instrumentation
 - Radiation tolerance requirements even more demanding
 - Sensors, electronics and “low-tech”: powering
 - Highly granular Lar calorimeters
 - Irradiation facilities
 - Machine learning for fast track and image reconstruction, trigger
- Future lepton colliders
- Higher precision, less material
- Requirements for linear and circular machines very similar
 - Except electronics, powering, cooling
 - Circular machines have much higher rates and require continuous powering
 - Need to push limits of particle ID
 - Gaseous tracking
- Most aggressive requirements may be posed by the Z factory
 - 1e5 x LEP statistics
- Non-collider experiments



- **No Transnational Access:**
- This was one of our biggest successes; need to find new ways of directing EC funds to facilities; WP15-type of upgrade (“innovation”) activities, network
- Involvement of **industrial partners as beneficiaries:**
- Works in parallel Accelerator Initiative ARIES; need to understand how to protect their IP; start with known partners
- Emerging **roadmap** of future collider projects:
- Need to establish our own technological roadmap, in the proposal and during the project, long-term projects require intermediate goals
- **Sustainability** of matching funds:
- Will need to find ways to demonstrate the long-term commitment of partners



- **Suggestions for the FCC community:**
- Start thinking about EoIs
 - Submit one for each type of activity foreseen
 - Areas of interest could be: **vertex trackers, calorimetry, gas detectors, advanced software, electronics, mechanics and cooling**, etc.
 - If you have industrial partners please outline them
- Remember that AIDA-2020 has proven to be a very effective forum for cross-experiment discussion and development
 - Activities that could be of interest and involve other experiments and accelerators are greatly welcome



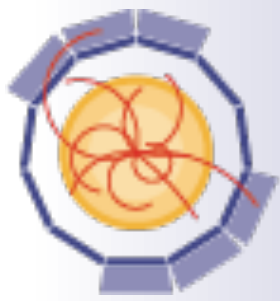
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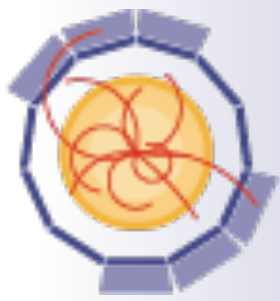
Back-up



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- **Separation** between call II-03 and II-04, in particular AIDA++ and ATTRACT
- II-03 aims at **innovation for markets outside RI**
- II-04 **innovation for the delivery of services, or new services of RI**
- What is **Innovation**?
- For ATTRACT: launch of a new product to market
- For us: we are invited to interpret the topic for our community
 - Can be incremental
 - Low and high TRLs**
- * **RI** – Research Infrastructure
- ** **TRL** - Technological readiness level



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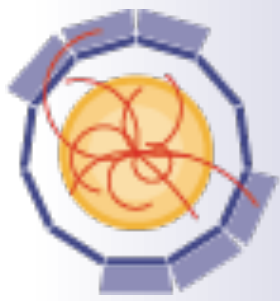
ATTRACT & AIDA-2020++

ATTRACT

- Emerging communities
- Competitive
- Independent projects
- Fully bottom-up approach
- Break-through development
- Co-innovation for non-HEP markets
- Third-party funding
- Diversifying

AIDA-2020++

- Advanced community
- Collaborative, compete globally
- Interdependent work packages
- Aligned with European Strategy and corresponding roadmaps
- Evolutionary development
- Innovation mainly via pre-procurement R&D for HEP
- Leverage on national funding
- Integrating



AIDA²⁰²⁰

Collaboration agreements

- Emphasis is on keeping each other informed
 - **Avoid duplication and double-funding**
 - Information exchange, mutual invitations
 - Dividing line for double funding should be drawn
- Provide access to results for other projects
 - if needed; the giving side decides
- CA's within II-04 and between II-03 and II-04
- ATTRACT just finished selection of projects for seed funding
 - 150 projects à 100k, should be known now or soon
- 5-10 multi-M€_projects for growth phase only after submission of our next proposal