

Website

- How it looks like now
- Where to complain...

Kristin Lohwasser¹, Ivica Puljak²

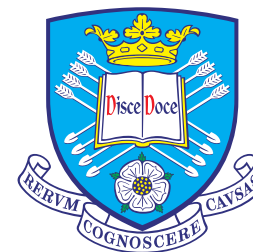
¹University of Sheffield

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European Research Council

Established by the European Commission

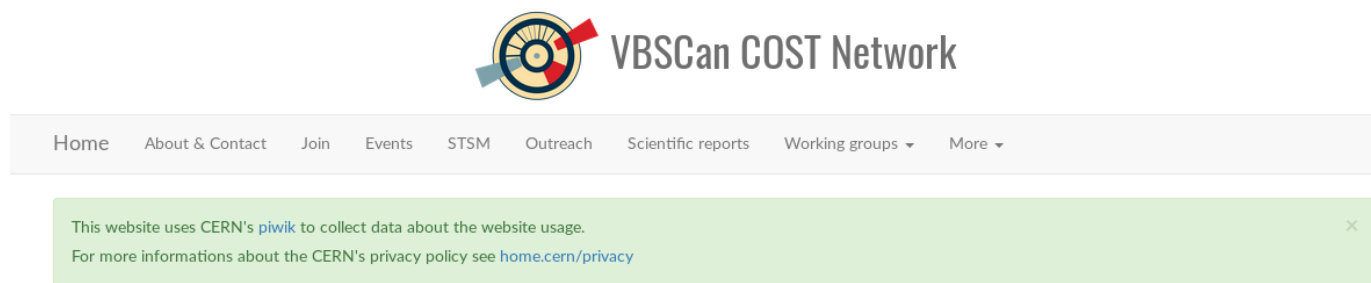


The
University
Of
Sheffield.

The website

> <https://svil-vbscanaction.iplusservice.it/Default.html>

- Online since April
- 4x updates per year can be scheduled (→ some subsites still on twiki – e.g. jobs)



Challenge

The main goal of the VBSCan project is to investigate the Vector Boson Scattering (VBS) process and its implications for the Standard Model, by coordinating existing theoretical and experimental efforts in the area and by best exploiting hadron colliders data, thereby laying the groundwork for long-term studies of the subject and creating a solidly interconnected community of VBS experts.

Why?

Vector Boson Scattering processes are key for the understanding of the Standard Model of particle physics and involve the internal scattering of bosons. They have been measured in 2017 for the first time ever - exciting times for particle physicists exploring these new territories!

[Join us](#)

Upcoming events

- First EWSB Spring School, 15-21 April 2018, Maratea, Italy ([indico](#) - [poster](#))
- VBSCan 2nd Annual Meeting, 19-21 June 2018, Thessaloniki, Greece ([indico](#))

Useful links

- [COST webpage of the VBSCan action](#)
- Full project [description](#) (within the Memorandum of Understanding)
- [Information on COST and Documents](#)
- [Working groups](#)



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About and Contact



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About us

The VBSCan community says: Yes, we can - finally study this very interesting physics process.

Through the help of the EU COST action it connects all main players studying Vector Boson Scattering at hadron colliders, and builds the solid and multidisciplinary community needed for this challenge.

Grant Information (Management committee and Participants)

Contact us

To contact the VBSCan please write an email to:

- Action chair: [Dr Pietro GOVONI](#)
- Workgroup 1
- Workgroup 2
- Workgroup 3
- Workgroup 4
- Workgroup 5





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How to join us

People from institutes already in the VBSCan action are de facto in the action. An overview over participating countries can be found [here](#)

You can join the VBSCan action in cases your country is not represented in the Management Committee, but also in the case it is already represented.

If you are interested to participate please contact the action chair ([Dr Pietro GOVONI](#)).

The final decision about new members of the action is approved by the Management Committee.

More information how to join COST actions is available here:

- <http://www.cost.eu/participate>
- http://www.cost.eu/participate/join_action

[See useful resources to work with us](#)



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Workshops

- VBSCan Kickoff Meeting, 28 - 30 June 2017, Split Croatia ([indico](#))
- VBSCan 2nd Annual Meeting, 19-21 June 2018, Thessaloniki, Greece ([indico](#))

Schools

- First EWSB Spring School, 15 - 21 April 2018, Maratea, Italy ([indico](#) - [poster](#))



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Short-term scientific missions

Completed

- Describing the VBS processes: 12-17.11.2017 in Nikhef, in Amsterdam. ([read more](#))
- Study of WZ VBS processes 19.11.-14.12.2017 in ITKP, Dresden ([read more](#))

Rules

[PDF version](#)

Opening of the STSM call

VBSCan is open for receiving STSM applications from July 1st 2017.

Purpose

Short Term Scientific Missions (STSM) are aimed at strengthening existing networks and fostering collaborations by facilitating researchers and scholars participating in VBSCan to visit an institution / organisation in another Participating COST Country / an approved NNC institution or an approved IPC institution. A STSM should specifically contribute to the scientific objectives of the COST Action, whilst at the same time allowing those partaking in the missions to learn new techniques, gain access to specific data, instruments and / or methods not available in their own institutions / organisations.

Who can apply

STSM applicants must be engaged in an official research programme as PhD Students, postdocs, be employed by, or affiliated to, an institution participating in the program. A necessary condition is that the Host and Home Institutes of the participant are located in two different countries.

How to apply

Visit <https://e-services.cost.eu/stsm/apply/new>

Duration

The minimal duration of STSMs is 5 days and maximum 90 days, which can be extended to 180 days for Early Career Investigators (ECI), that is, researchers with up to 8 years of experience after obtaining their PhD (students are not considered ECIs). Each STSM must be carried out entirely in a single Grant Period, that is from 1st of May till 30th of April.

Funding

The STSM grant can contribute to the costs of travel, accommodation and meal expenses up to: 2 x 20E /day for meals, 120E/night. The following criteria must be respected: the total cost of the awarded STSM must not exceed Eur 2500 (Eur 3500 for ECIs), while the daily rate for accommodation and meal expenses must not exceed Eur 160.



New fakerate (pink) vs old fakerate (blue): Muons



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June 2017 - Beer and Brains in Split

Meet and greet a real-life particle physicist and learn what it really is like to work with "Big-Bang-Theory"-Brainiacs - this chance had locals and tourists alike on the first evening of the first VBSCan workshop. A flyer in croatian and english invited them to join the participants of the VBSCan workshop to join them in the Peristil - central square of the Diocletian Palace in Split. Nametags in the style of the flyer identified the participants, who had also brought photographs from CERN or material from their latest scientific result. Discussions, one to one, or in small groups gave people the opportunity to ask, what they never dared asking before. Lively discussions ensued, ranging from physics in general over life at CERN to science in Croatia.

Flyer

Two flyer panels for a workshop. The left panel is titled "Beer and Brains" and the right panel is titled "Pivo i mozgovi". Both panels feature a central illustration of a brain with four glasses of different beverages (red wine, beer, red wine, and beer) around it. The text on the left panel is in English, and the text on the right panel is in Croatian.

Beer and Brains
Meet physicists working at CERN
Find out what it's like at the LHC
Drinks and Discussion, no Talks
Drop in whenever you like
Multiple languages spoken

Pivo i mozgovi
Susret s fizičarima koji rade u CERN-u u Ženevi
Upoznajte što to znači raditi na LHC-u
Piće i diskusije, bez prezentacija
Dođite kad želite
Diskusija moguća na više jezika





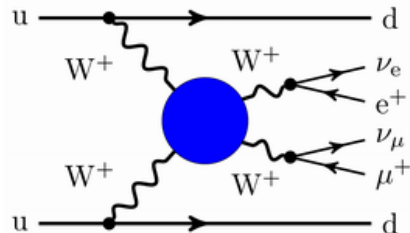
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[List of VBSCan Publications](#)

November 2017 - Precise predictions for vector-boson scattering at the LHC

The Large Hadron Collider (LHC) is the largest physics experiment in the world and is based in Geneva (Switzerland). It is colliding bits of matter at very high energy in order to produce elementary particles. These particles are numerous and each of them have different characteristics that allow them to be "seen" in different parts of the detectors built around the interaction points of the colliding beams. The task of the physicists working in particle physics is to verify if the theoretical predictions match the experimental measurements. If they don't, this might be a sign of unknown mechanisms.

The collision of two protons (the tiny bits of matter) can produce many particles in different ways and these are called processes. The processes with only two particles in the final states are easier to compute with high precision than theories with high multiplicity. On the experimental side, the processes with low multiplicity happen more often and are thus measured more precisely due to higher statistics. On the other hand, processes with high multiplicity are more difficult to compute theoretically and are also more complex to see experimentally. In order to accumulate enough statistics one should then wait longer and collide protons at higher energy.



The latter is actually happening at the LHC where now protons are collided at a centre-of-mass energy of 13 TeV. This has never been achieved before and this means that experimental collaboration (ATLAS and CMS) are now able to measure very rare processes with up to 6 particles in the final state. Among these processes, key processes for the understanding of the Standard Model of particle physics are processes that involve the internal scattering of bosons (see Figure).

These are generically dubbed vector-boson scattering (VBS) processes and have been measured for the first time a few months ago. The study of these processes constitutes the main focus of the VBSCan COST action.

In this exciting time for particle physicists exploring these new territories, it is very important to have precise and reliable predictions for such processes. During this short term scientific mission (STSM), several theorists have gathered at the institute Nikhef in Amsterdam (the Netherlands).

This week of work has been devoted to performing comparisons of various theoretical predictions. This allows to infer whether approximations commonly used are reasonable or not and to investigate whether there are ambiguities between different predictions, especially when parton showers are used. Such a work is very important for experimental collaborations as this provides them with indications on how to use and interpret theoretical calculations with their intrinsic errors. In that way, theoretical predictions are used appropriately by experimental physicists so that they can make the most of the data of the LHC. A report to be published in a peer-reviewed journal is in progress and will become public in the coming months.

Study of WZ VBS processes

How probably is it that the observed events stem indeed from the process that we are interested in? Can we increase the ratio of signal (what we are interested in) to the background (what we are not interested in)?

These were the questions, Despoina Sampsonidou from Aristotle University of Thessaloniki tackled together with scientists at the Technical University TU Dresden, visiting the Institute IKTP from November 19th to December 14th 2017. Together they concentrated on the study of the W±Z production via Vector Boson Scattering (VBS) in the ATLAS experiment.

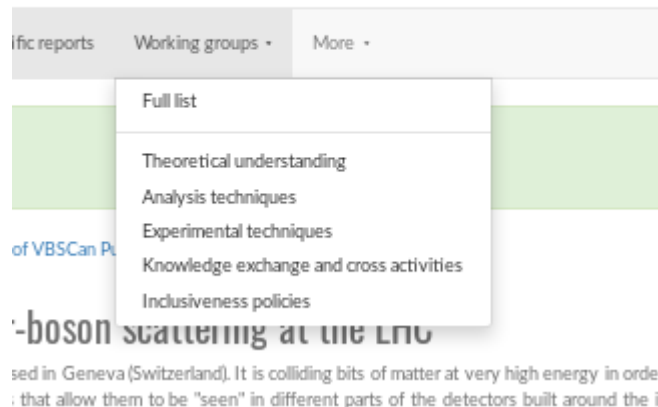
ATLAS is one of the four major experiments at the Large Hadron Collider (LHC) at CERN. It is a general-purpose particle physics experiment run by an international collaboration and, together with CMS, is designed to exploit the full discovery potential and the huge range of physics opportunities that the LHC provides.

The VBS production is a rare but at the same time a very important set of processes that it will be possible to measure at LHC. It manifests itself as two high-energetic, well-separated jets in the detector, produced together with two vector bosons (dibosons). So in the final state of the event, apart from the two jets, the decay products of the two vector bosons are present and can be used to select the signal events instead of uninteresting background.

The study of such states may provide evidence for the existence of New Physics, which will manifest itself at energies higher than the ones available in the LHC collisions currently. The 13 TeV

Working groups

VbScan COST Network



- With links to respective twikis

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General group

<https://groups.google.com/forum/#forum/vbscost>

Working group 1: Theoretical understanding

- [TWiki page](#)
- [Group page](#)
- Contact email vbscan-wg1@googlegroups.com
- [CERN Indico](#)

Goals:

- Detailed description of the VBS signal and relative backgrounds in the SM cases as well as EFT modelling of BSM effects.
- Coordination of NLO QCD and EWK SM calculations
- EFT definition, and NLO QCD and EWK EFT calculations
- VBS signal definition

Working group 2: Analysis techniques

- [TWiki page](#)
- [Group page](#)
- Contact email vbscan-wg2@googlegroups.com
- [CERN Indico](#)

Goals:

- Definition of data analysis protocols and agreements to maximise the significance of VBS analyses at hadron colliders, fostering the communication between theory and experim
- Determination of the best observable quantities for VBS data analysis
- Implementation of advanced data mining techniques in the signal characterisation
- Experimental results publication and combination guidelines

Working group 3: Experimental techniques

- [TWiki page](#)
- [Group page](#)
- Contact email vbscan-wg3@googlegroups.com
- [CERN Indico](#)

Goals:

- The WG3 hosts discussions regarding experimental techniques and physics object reconstruction that is relevant for VBS signature. Both current LHC and future accelerators a... particulare HL-LHC. The group discuss both the current status of reconstruction techniques, based on public experimental results, and the possible new techniques with the ai... level studies and simplified simulations.



More....

COST Network

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- Grant information
- People

twiki

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People

- Ballestrero, Alessandro
 - INFN Torino (IT)
- Bellan, Riccardo
 - University and INFN Torino (IT)
- Biedermann, Benedikt
 - University of Würzburg (DE)
- Bittrich, Carsten
 - Technische Universität Dresden (DE)
- Braß, Simon
 - University of Siegen (DE)
- Buttenworth, Jonathan
 - Department of Physics and Astronomy, University College London (UK)
- Cacciari, Matteo
 - Sorbonne Universités and CNRS, LPTHE, Paris (FR)
- Covarelli, Roberto
 - University and INFN Torino (IT)
- Cuevas, Javier
 - University of Oviedo (SP)
- Demner, Ansgar
 - University of Würzburg (DE)
- Di Ciaccio, Lucia
 - LAPP, Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS/IN2P3, Annecy (FR)
- Dittmaier, Stefan
 - Albert-Ludwigs-Universität Freiburg (DE)
- Dunic, Senka
 - University of Wisconsin-Madison (US)
 - Kansas State University (US)
- Farrington, Shead
 - Department of Physics, University of Warwick, Coventry (UK)
- Ferreira Silva, Pedro
 - CERN (CH)
- Finco, Linda
 - University and INFN Torino (IT)
- Glover, Nigel
 - Institute for Particle Physics Phenomenology, Department of Physics, University of Durham (UK)
- Gomez-Ceballos, Guillermo
 - Massachusetts Institute of Technology, Cambridge (US)
- Goy, Corinne

■ From Split report (should be updated)



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Publications within the VBSCan network

Publications within the LHC experiments

Standalone publications and arxiv reports

- VBSCan Split 2017 Workshop Summary -- Anders, Christoph Falk and others, 2018, VBSCAN-PUB-01-17, <https://arxiv.org/abs/1801.04203>
- Resonant production of Wn and Zh at the LHC -- Antonio Dobado, Felipe J. Llanes-Estrada and Sanz-Cillero, Juan J. J. High Energ. Phys. (2018) 2018: 159., <https://arxiv.org/abs/1711.10310>
- Precise predictions for same-sign W-boson scattering at the LHC -- Ballestrero, Alessandro and others, 2018, submitted to EPJC, VBSCAN-PUB-01-18, <https://arxiv.org/abs/1803.07943>



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Useful resources

- CERN Twiki
- Google group forum [Subscribe!](#)
- Google drive folder [Subscribe!](#)
- Summary page on travel reimbursements
- Evaluation report
- COST page containing reference documents (COST Implementation Rules, COST Vademecum, COST Action Template Centre and Key Documents)
- Meetings overview ([indico](#))
- Meetings general ([indico](#))
- TWiki pages
- GitLab
- Latest articles related to VBS research topics (note: not necessarily created as part of the VBS action): <https://wiki.cern.ch/twiki/bin/view/VBSCan/PapersOfInterest>

. CERN Twiki

To access the [TWiki page](#) you have to add yourself to the e-group (see below for instructions).

To access it, please subscribe with your CERN account.

If you don't have a CERN account, you can get a [lightweight one here](#).

Instructions to add yourself to the vbscan-general e-group

1. Open the [e-group page](#)
2. Click on [Members](#) tab
3. Click on [Add me](#) button

. GitLab

The GitLab server (<http://vbscan.fsica.unimib.it>) has been setup, hosted in the Milano-Bicocca computing centre.

Unfortunately there's no way of using the CERN SSO for the authentication of the users, therefore everyone needs to create an account there.

An internal VBSCan GitLab group, where all projects will be hosted, will ensure the privacy of the COST action work.



How to suggest improvements / complaints

Mail to the google group:

vbscan-wg5@googlegroups.com

vbscan-wg4@googlegroups.com

Ivica, Kristin

And also add them here:

<https://docs.google.com/document/d/1Nkdbk0sKVLBgDNliaMmdXAGiuHcTQDiKo1zH96FLKVw/edit?usp=sharing>

(will use this to collect comments)



BACKUP