



Beyond Standard Model: Where do we go from here? Johns Hopkins Workshop Series

Galileo Galilei Institute, Arcetri Firenze - Oct, 1-5, 2018

Local Johns Hopkins Workshop organizers:
Stefania De Curtis, Michele Redi, Domenico Seminara
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Abstract. The Johns Hopkins Workshops meet annually; they rotate among the participating universities around the world. The purpose of each workshop is to discuss outstanding questions in theoretical physics. The 42nd Johns Hopkins Workshop was held in Florence at the Galileo Galilei Institute. The goal was to gather theorists and experimentalists from various fields to take a fresh new look at physics beyond the Standard Model.

Keywords. Physics Beyond Standard Model, LHC results, Future Accelerators.

The 42nd Johns Hopkins Workshop (JHW) was held in Florence at the Galileo Galilei Institute (GGI). It was organized as the final conference of the two-month program with the same title: “Beyond Standard Model: Where do we go from here?” (see the report in this issue of “Il Colle di Galileo”). The organizing committee of the GGI program was made up of experimentalists and theorists: Patrizia Azzi (INFN Padova), Dmitry Budker (HIM/JGU Mainz / UC Berkeley), Roberto Franceschini (Roma 3), Andreas Hoecker (CERN), Gilad Perez (Weizmann Institute), Michael Peskin (SLAC), Tracy Slatyer (MIT), Andrea Tesi (INFN Florence), Liantao Wang (University of Chicago), Jure Zupan (University of Cincinnati).

The goal of the 2018 JHW was to gather theorists and experimentalists from various fields to take a fresh look at physics beyond the Standard Model (SM). First the status and the challenges of mainstream proposals for physics beyond the SM were reviewed. This was the starting point for discussing what lies ahead, addressing what could be expected by the next round of experiments and what will be needed to make further progress, especially if new physics is not what theorists imagined over the last three decades.

Particle physics is undergoing an era of transition. While the existence of physics beyond the SM is obvious in cosmological data, the theoretical expectations

**The Galileo Galilei Institute
For Theoretical Physics**

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Johns Hopkins Workshop Series
1-5 October 2018 - GGI, Florence

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**Johns Hopkins Workshop
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The chase for new physics is in full swing. We have several theoretical motivations for the existence of physics beyond the Standard Model of particle physics and a very diverse set of experimental investigations are aimed at finding new physics.

In this workshop, we will bring together experts from theory and from many areas of experimental investigation to discuss the current state of proposals for physics beyond the Standard Model. We will discuss and debate the lessons that we should draw from the results of the LHC run 2, from flavor physics, from searches for dark matter, and from low energy precision measurements.

The workshop will also begin the discussion of the next possibilities for searches for new physics, particularly in anticipation of the next European Strategy for Particle Physics expected in 2019/20.

Web: <https://indico.cern.ch/event/676835>
Contact: Roberto Franceschini - roberto.franceschini@uniroma3.it
Picture: Paul Gauguin - D'ou venons-nous? Que sommes-nous? Ou allons-nous?
Courtesy of Museum of Fine Arts Boston
Graphic design: Roberto Baglioni

Figure 1. The poster of the 42nd Johns Hopkins Workshop.

on where new physics will appear have not been so far confirmed by experiments. Presently it seems quite likely that discovering physics beyond the SM will require new ideas and new methods beyond the traditional toolkit of particle physicists.

The workshop was organized over five full days, with about 50 talks on several topics, both experimental and theoretical, by the world's leading experts, to try to answer the common question; "Where do we go from here?". This is also the title of the famous painting by Paul Gauguin, used for the poster of the workshop (Figure 1).

Each day focused on a different topic ranging from collider physics to cosmology. On Monday, the current status of new physics searches at LHC was reviewed, followed on Tuesday by low energy signals of new physics such as axions. The main focus on Wednesday was dark matter and the early Universe, while Thursday focused on future colliders. A significant part of the workshop was devoted to discussing new experimental facilities in anticipation of the next European Strategy for Particle Physics, expected to take place in 2019/20. On Friday, there were speculative talks on the future of physics beyond the SM by renowned theorists such as Raman Sundrum. The conference ended with the lecture by Prof. Nima Arkani-Hamed "The World is not a crappy Metal".

More information and the slides can be found on the website <https://indico.cern.ch/event/676835/overview>.

The 42nd JHW was participated in by physicists from all over the world (Figure 2) and was a great opportunity to discuss and share ideas and projects for the future.

Johns Hopkins Workshops

(<https://physics-astronomy.jhu.edu/events/workshops/>)

The Johns Hopkins Workshops meet annually; they rotate among the participating universities in America, Europe and Asia. The purpose of each workshop is to discuss outstanding questions in theoretical physics. Topics can range from mathematical physics to cosmology. Typically, each workshop is restricted to one or two topics. Often, two topics to be discussed are chosen in such a way as to stimulate a dialog between two groups of physicists. Currently, the following universities host the workshops: Chalmers University (Göteborg, Sweden), Eötvös Loránd University (Budapest, Hungary), University of Florence (Florence, Italy), University of Heidelberg (Heidelberg, Germany), Johns Hopkins University (Baltimore, MD, USA). (For a certain length of time, the Universities of Bonn (Germany) and Lanzhou (People's Republic of China) also participated in the collaboration.)



Figure 2. Participants of the 42nd Johns Hopkins Workshop at the GGI.

As of 2018, the Kavli Institute for the Physics and Mathematics of the Universe (IPMU) in Japan has joined the Johns Hopkins Workshop Series. They will organise and host the next edition, which will take place at the beginning of October 2019.