



# Binational Heraeus Summer School: Astronomy from 4 perspectives: IV – Origins of stars and planets

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**Abstract.** The Heraeus Summer Schools “Astronomy from four perspectives” bring together teachers, professional astronomers, student teachers and university astronomy students from Germany and Italy. Each Summer School has a different astrophysical theme. After Heidelberg 2013, Padua 2014 and Jena 2015, the fourth edition took place in Florence in August 2016. The aim is to create and maintain a network of university and high school teachers and to develop materials and methods on current research in astronomy and astrophysics to be used in high schools.

**Keywords.** Astronomy and astrophysics, teaching, stars and planetary formation.

The series of schools is devoted to developing methods and selecting advanced astronomical topics that can be used to teach astronomy and physics in high schools. Participants come from different backgrounds, both geographical – Germany and Italy – and in terms of field of work, age and role. They include university professors, PhD students in Physics and Astronomy and high school teachers as well as university students in Physics, Astronomy and Education. During the year, in each of the four universities, high school teachers and university students attend a specific course on the topic of the year. Then, in the summer, they meet each year in one of the universities: Heidelberg 2013 (Cosmology), Padua 2014 (Active Galactic Nuclei), Jena 2015 (Gravitational waves) and Florence 2016 (Origins of Stars and Planets).

The Heraeus Summer School of Florence took place in the last week of August 2016 in the Department of Physics and Astronomy in Florence. More than

70 students and teachers, from Heidelberg, Padua, Jena and Florence met, worked and discussed together. The school offered a combination of lectures by scientists and science educators, contributions from the participants, guided discussions, hands-on tutorials, and special lectures dealing with exercises or insights that could be presented to high school students. The lecturers mostly came from the four participating universities and institutes, with contributions from scientists from research institutions such as the European Southern Observatory (ESO) and the National Institute for Astrophysics (INAF). During these lectures the participants learned about the properties of the interstellar medium, modern techniques of observation such as radio interferometry using the ALMA (the amazing new submillimetre interferometer in Chile) and how stars and planets form. In order to consolidate the most important topics, in the tutorials PhD students from the University of Florence and researchers from INAF proposed real science cases analysed in a professional manner as guided exercises. A link to the previous year's school was the visit to the Virgo Gravitational Wave interferometric antenna in Cascina (Pisa) where the participants were able to explore the experimental set-up for the detection of gravitational waves. Every day the exchange of experience led to lively discussions in the scheduled time and also in the evenings, when mixed groups met together to talk and take a stroll downtown at the same time.

Another very important aspect of the schools was the social programme. The group had a fascinating Solar observation experience with the Amici Telescope during a visit to the Arcetri Observatory, linked both to the history of physics and astronomy in Florence and to current scientific outreach activities. The group then visited the Galileo Museum, which exhibits Galileo Galilei's original instruments and several copies of his writings, and the Opera del Duomo Museum.

The success of this project stemmed from the enthusiasm of the lecturers and the participants, and from the encouragement and generous funding of the Wilhelm-und-Else Heraeus Stiftung, which we gratefully acknowledge.

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Group picture of the Heraeus Summer School in Florence. We would also like to celebrate Francesco Palla, who played a leading role in the project “Astronomy from four Perspectives”, and sadly passed away at the end of January: we miss him for his enormous help in giving life to this project, and for the energy and dedication he put into his work. (Picture: courtesy of M.Pössel).