

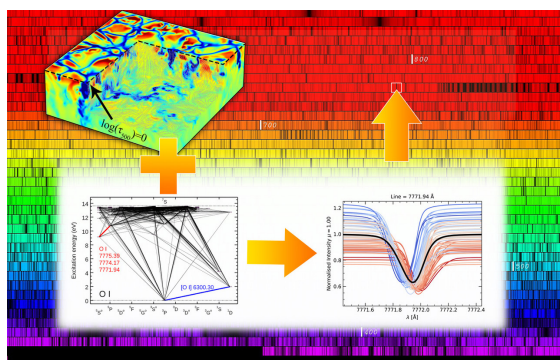
New Horizons Solvay Lectures in Physics



Prof. Maria Bergemann
(Max Planck Institute, Heidelberg, Germany)

Maria Bergemann is an astrophysicist and head an independent research group at the Max Planck Institute for Astronomy in Heidelberg. Her research interests are radiative processes in astrophysics, spectroscopy and stellar physics, chemical evolution of the Milky Way and star-forming galaxies, and cosmic nucleosynthesis. She studied physics at the Kazan State University, but spent many years working, in parallel, in exploration geophysics, in particular on the analysis of geothermal reservoirs and their properties in connection with hydrocarbon deposits. After graduating from the KSU, she was offered a PhD position in geophysics at Cornell University, but chose to pursue doctoral studies in astronomy at Ludwig Maximilian University in Munich.

Reading physics from stellar spectra



The Milky Way galaxy is host to a few hundred billion stars. Of them, about 10 million, less than 0.01%, have so far been mapped by large-scale spectroscopic surveys. Major progress in the quantity and/or quality of data is expected with next generation astronomical facilities.

In this colloquium, I will focus on the frontiers in diagnostic stellar spectroscopy.

First, I will summarize the physical principles behind models that allow us to extract physical parameters of stars from their observed spectra. 3D non-equilibrium models are poised to become workhorses of astronomy in the next decade.

Second, I will show how we overcome another challenge: the innovative combination of the models and complex noisy data.

Third, I will demonstrate how new data, new models, and new statistics drive progress in the areas that rely on stellar parameters and chemical composition of stars. These include studies of exoplanets, stellar evolution, nucleosynthesis, gravitational wave sources, and Galaxy formation. I will close with a personal view of perspectives opening with large facilities of the next decade, such as SDSS-V, 4MOST, and ELT.

Monday 18 October 2021 at 4.00 pm.

COFFEE AND TEA WILL BE SERVED AT 3:45 P.M IN FRONT OF THE SOLVAY ROOM

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