UNIVERSITÄT DUISBURG ESSEN

PHYSIK E=

Physikalisches Kolloquium

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13:00 Uhr
MC 122 und Zoom

Towards the Discovery of Young Planets

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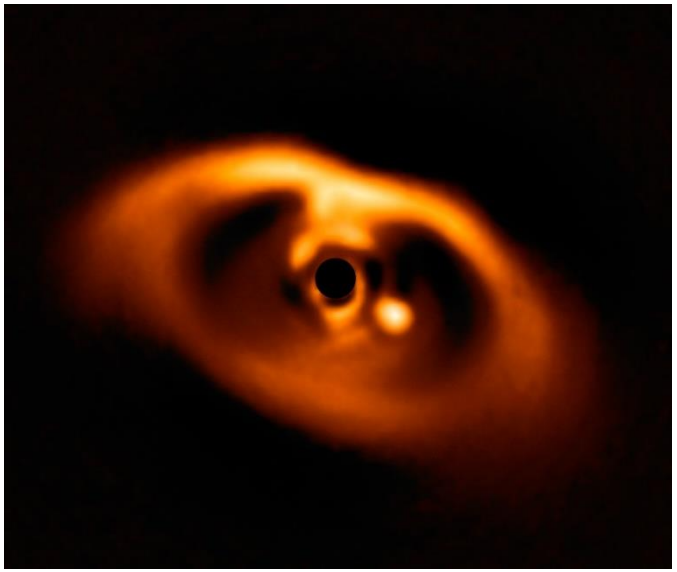
https://uni-due.zoom-x.de/j/64228670246?pwd=RjVQeFNIUkRKRkpiNVpKYXhJaFNLdz09



In order to make progress in understanding the formation of planetary systems we need to combine comprehensive observing programs, theoretical modeling, and dedicated laboratory experiments.

Our solar system formed 4.567 Billion years ago. Today's structure and dynamics of our planetary system together with cosmochemical constraints provide the basis for reconstructing the early history of its formation. With population synthesis simulations – based on planet formation theories – we are trying to build a bridge between the properties of planet-forming gas-dust disks around young stars and mature planetary systems. Such models have achieved some success, but need more guidance from observations.

Nearly all of the more than 5000 exoplanets discovered so far orbit mature stars and have been detected by indirect techniques, not direct imaging. How much better would it be for our understanding of planet formation to directly image a planet in its birth environment? In order to achieve this goal one needs to push the technique of adaptive optics at 10m-class telescopes to its limits. Together with sophisticated data analysis tools, we are now coming closer to reach this goal. Indeed, we discovered and directly imaged the very young planet PDS 70b in its birth environment. Soon after this detection a second planet has been discovered in the same system. Both planets are still accreting gas from their parental disk and seem to be in resonance. The planet-forming disk is now characterized by mid-infrared JWST and long-wavelength ALMA observations, demonstrating the importance of multi-wavelength data in modern astronomy. I will discuss the search for young exoplanets and the properties of the PDS 70 planetary system, including the most recent discovery of water in the terrestrial planet-forming zone.