

Evening Talk

PV XI Wed 19:00 AudiMax

Lise-Meitner-Lecture: Gravitational wave astronomy – quo vadis? — ●MICHÈLE HEURS — Leibniz Universität Hannover, Hannover, Germany — Deutsches Zentrum für Astrophysik (DZA), Götting, Germany — Deutsches Elektronen-Synchrotron DESY, Zeuthen, Germany

Since the first direct detection of gravitational waves (GWs) in 2015, we have opened an entirely new observation window into the Universe (complementary to the electromagnetic spectrum, neutrinos, and cosmic rays), heralding the era of multi-messenger astronomy with GWs. A wealth of scientific insights has already been gained – but so much more is yet to be discovered!

The sensitivity of current GW detectors is so incredible that the

quantum noise of the employed ultra-stable laser light would be limiting. This necessitates the use of non-classical (“squeezed”) light, which is already routinely employed in the current (second) generation of detectors, e.g., aLIGO and AdVirgo. Many additional noise sources, such as seismic and thermal noise, pose further challenges for future (third-generation) detectors, e.g., the Einstein Telescope, a planned underground GW observatory in Europe.

To learn more about our Universe, we must achieve ever-higher detection rates for meaningful GW astronomy, which requires ever-greater detection sensitivity and larger detection bandwidth. In my talk, I will introduce the principle of interferometric GW detection, highlight some of the advanced technologies (employed and under development), and shed light on the plans for future interferometric GW observatories.