GR 19: Hauptvorträge Relativistische Astrophysik

Zeit: Freitag 11:00–12:30 Raum: ZHG 002

Hauptvortrag GR 19.1 Fr 11:00 ZHG 002

Accretion onto Sagittarius A* at the Center of the Milky Way — •Andreas Eckart — I. Physikalisches Institut, Universität zu Köln; Zuelpicher Str. 77; 50937 Köln

The super-massive 4 million solar mass black hole (SMBH) SgrA* shows flare emission from the millimeter to the X-ray domain. Near-infrared polarimetry shows signatures of strong gravity that are statistically significant against randomly polarized red noise. This allows us to derive spin and inclination information of the SMBH. A detailed analysis of the flares in the framework of a Synchrotron Self Compton (SSC) mechanism shows that a scenario in which the infrared flares are explained by synchrotron emission and the associated X-ray flares are produced via SSC emission can also explain the variability spectrum observed in the sub-millimeter radio domain. The light curves suggest in many cases that the mm flare emission follows the NIR emission with a delay of 1.5 - 2 hours indicating that adiabatic expansion of a plasma of relativistic electrons is at work. A detailed analysis of the infrared light curves allow us to address the accretion phenomenon in a statistical way. The analysis shows that the flare amplitudes are dominated by a single state power law. SgrA* also allows us to study the interaction of the SMBH with the immediate interstellar and gaseous environment of the central stellar cluster. It appears that through infrared imaging of the central few arcseconds one can study both inflow and outflow phenomena linked to the SgrA* black hole. SgrA* will also be compared to nuclei of nearby galaxies and to higher luminosity extragalactic active nuclei.

Hauptvortrag GR 19.2 Fr 11:45 ZHG 002

Probing the nature of gravity with radio pulsars — •Norbert Wex — Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, D-53121 Bonn, Germany

Nearly four decades have passed since the discovery of the first radio pulsar in a binary system by Joseph Taylor and Russell Hulse. The most well-known use of this precise "cosmic clock" has been its role in tests of gravity theories, in particular in the (indirect) verification of the existence of gravitational waves.

Since then, additional binary pulsars have been discovered, allowing us to test different aspects of gravity. A particularly interesting system in this respect is the so-called "Double Pulsar", a unique system where two active radio pulsars orbit each other in less than 2.5 hours.

Currently there are efforts to find the first pulsar orbiting a black hole. This would complement the pulsar gravity tests in a unique way. The ultimate laboratory would be a pulsar in a tight orbit around the supermassive black hole in the centre of our Galaxy.

In addition to gravity tests with the binary motion of pulsars, there is presently a world wide effort for a direct detection of nano-Hz gravitational waves from supermassive black hole binaries, using an array of pulsars with very high rotational stability.

After a short introduction to pulsars and pulsar timing, I will summarise some of the more recent gravity tests with binary pulsars, outline the potential of a pulsar-black hole system which is yet to be discovered, and highlight some aspects of using pulsars as a gravitational wave detector.