SYCC 1: Symposium Cosmic Censorship

Zeit: Montag 16:30–18:30 Raum: HS 1010

Hauptvortrag SYCC 1.1 Mo 16:30 HS 1010

Determinism, strong cosmic censorship, and the strength of singularities inside black holes — •Jan Sbierski — University of Cambridge

In classical mechanics, the initial position and velocity of a particle determine uniquely its future trajectory. This talk is concerned with the analogous question in general relativity: given initial data for the Einstein equations, is the future development uniquely determined? The strong cosmic censorship conjecture states that this should be the case – at least generically.

In the interior of black holes it is expected that singularities bring classical time evolution to an end and in this way rule out a further non-unique future development. I will give a brief overview of known results and discuss an example of such a terminal singularity.

Hauptvortrag SYCC 1.2 Mo 17:00 HS 1010

Quasi-stationary collapse scenarios support cosmic censorship — •Reinhard Meinel — University of Jena, Germany

The quasi-stationary (parametric) collapse of a uniformly rotating disc of dust leads to the formation of a black hole and not to a naked singularity. This rigorous result represents a considerable support for the cosmic censorship conjecture - going far beyond the spherically symmetric case. Numerical results on rotating fluid rings and rotating discs of electrically charged dust provide further convincing evidence for this scenario.

Hauptvortrag SYCC 1.3 Mo 17:30 HS 1010

Approaching the Event Horizon of the Galactic Center Black Hole — •Frank Eisenhauer — Max Planck Institute for Extraterrestrial Physics, Giessenbachstr., 85741 Garching, Germany

The observations of stellar orbits and the extreme compactness of the central radio source provide compelling evidence that the Galactic Center harbors a supermassive black hole. Given its relative proximity, the Galactic Center is the ideal laboratory for studying the details of such an extreme object. Infrared and submillimeter interferometry are currently taking the next steps in the Galactic Center research by providing event-horizon scale astrometry and imaging resolution: Radio observatories will combine their telescopes accros the world with the goal of imaging the shadow of the black hole against the surrounding accretion flow, and the infrared interferometer GRAVITY - a new instrument combining the four 8m ESO Very Large Telescopes in Chile - will focus on measuring the motion of matter close to the last stable orbit and on detecting general relativistic effects in the stellar orbits at larger distance. The presentation will cover both the experimental and astrophysical aspects of these project and give an outlook on the exciting results to emerge in the upcoming years.

Hauptvortrag SYCC 1.4 Mo 18:00 HS 1010

48 Years of Cosmic Censorship, and Still We Do Not Know What It Is — •Erik Curiel — Munich Center for Mathematical Philosophy (LMU), Munich, Germany — Black Hole Initiative, Harvard University, Cambridge, MA, USA

In 1969, Roger Penrose proposed what has come to be known as the Cosmic Censorship Hypothesis. In his original formulation, Penrose conjectured that naked singularities could not form from physically reasonable initial conditions, but rather all singularities would be "hidden", in an appropriate sense, behind an event horizon. His motivation was to save a prima facie desirable form of determinism in physically reasonable spacetime models. Since then, many attempts of varied form have been made to sharpen and make more precise the conjecture, and to prove it (or, at least, one of its many formulations). In this talk, I will survey the most influential formulations, discussing their similarities and differences, the impetuses behind each, the theoretical evidence for and against them, and their conceptual strengths and weaknesses. I focus attention on the question of the reasons we may have, beyond the brute deliverance of entrenched physical theory, to expect that such a proposition may hold. I conclude by raising a question that I think deserves more attention than it seems to have been paid: if, as is widely and piously hoped, quantum gravity will efface singularities, why do we need to worry about this at all?