Daniel Grumiller Institute for Theoretical Physics

BLACK HOLES I (136.028)

Winter semester 21/22

Location: TUWEL (online teaching plus Q&A sessions)

Time: TBA (starting October 2021)

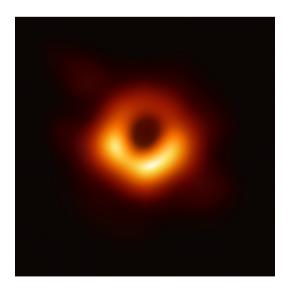
Summary:

Black holes have advanced to the forefront of current research in various disciplines: besides the obvious ones, general relativity, mathematical physics and astrophysics, also string theory, quantum chromodynamics, cosmology, computational physics, quantum gravity and even part of condensed matter physics devote a significant fraction of their resources to the study of black holes. It is thus both a fascinating and timely subject to investigate.

The main purpose of this lecture is a comprehensive introduction to black hole physics.

Contents:

History of black holes
Phenomenology of and experiments with black holes
Gravitational collapse and Chandrasekhar limit
Metric and geodesic equation
Geodesics for Schwarzschild black holes
Curvature and basics of differential geometry
Hilbert action and Einstein equations
Spherically symmetric black holes and Birkhoff theorem
Rotating black holes: the Kerr solution
Geodesics for Kerr black holes
Accretion disks and black hole observations
Black hole analogs in condensed matter physics



webpage: http://quark.itp.tuwien.ac.at/~grumil/teaching.shtml