Daniel Grumiller

Institute for Theoretical Physics

BLACK HOLES II (136.029)

Summer semester 20

Location: SEM FH, 3rd floor, yellow tower

Time: 9:00-12:00 each Tuesday (starting March 3)
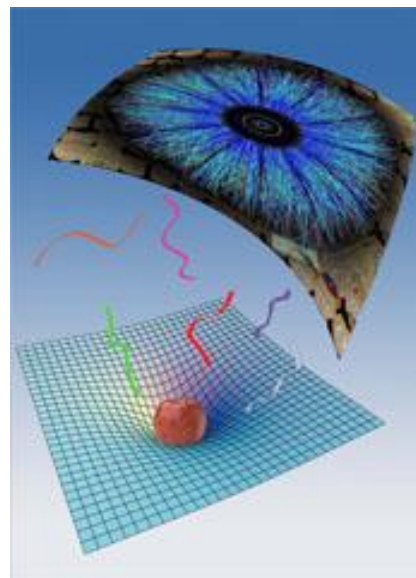
Summary:

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 treatment of advanced topics
and current research topics in black hole physics.**

Contents:

- Black hole definition, causal structure and Penrose diagrams
- Gravitational waves and black hole mergers
- Black hole perturbations and quasi-normal modes
- Black hole thermodynamics
- Hawking effect
- Action principle and boundary issues
- Holographic renormalization and Brown-York stress tensor
- Asymptotic symmetries
- Black holes in AdS

    ... and possibly further selected recent research topics

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