



Wintersemester 2015/16

**Oberseminar
Geometrische Analysis und Mathematische Relativitätstheorie**

Am Donnerstag, den **05.11.2015** spricht um **16 Uhr c. t.** im Raum N14

PD Dr. Oliver Rinne
(Albert Einstein Institut Potsdam-Golm)

über das Thema

**Applications of numerical methods to Einstein's
and other geometric evolution equations**

Numerical methods can provide helpful insights into general relativity well beyond the best-known example of binary black hole / neutron star mergers. In this talk I will give an overview of several projects I have been working on over the past few years. The first part of the talk is concerned with the Einstein equations on very large scales: methods to evolve asymptotically flat spacetimes including conformal infinity. A foliation of spacetime into hypersurfaces of constant mean curvature extending to future null infinity is used, with applications e.g. to late-time power-law tails of matter fields in black hole spacetimes. Conformally flat Cauchy data with a Schwarzschildian end at spatial infinity are constructed numerically, thus realising Corvino's gluing method. The second part of the talk is concerned with the Einstein equations on very small scales: gravitational collapse. I will give examples of how numerical evolutions can be used to probe the weak cosmic censorship conjecture and to study critical phenomena at the threshold of black hole formation. The third part of the talk is concerned with geometric evolution equations other than Einstein's. Examples include a non-local mean curvature type flow used to find static metric extensions in general relativity, and a new method to solve partial differential equations on manifolds with non-trivial spatial topology.

Hierzu wird herzlich eingeladen.

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