

## GR 14: Invited Talks 6

Time: Thursday 9:30–10:50

Location: H 2013

**Invited Talk** GR 14.1 Thu 9:30 H 2013  
**General Relativity and Astrometry** — ●SERGEI KLIONER —  
Lohrmann-Observatorium, TU Dresden

Unprecedented accuracy expected from space astrometry projects makes it indispensable to formulate the models of observational data in the framework of General Relativity. Without proper use of General Relativity it would be impossible to extract any sensitive physical information from observational data. Moreover, a high level of consistency between various parts of data processing chain is required. In this way, General Relativity becomes an applied discipline with many standard applications at the engineering level. On the other hand, the effects entering the relativistic models can be used to test the theory of relativity. An example of the ESA space astrometry mission Gaia will be used to illustrate high-accuracy relativistic data modeling. A suite of relativistic tests with astrometric data will also be discussed.

**Invited Talk** GR 14.2 Thu 10:10 H 2013

**Where is the energy stored in the gravitational field?** —  
●GERHARD SCHÄFER — Theoretisch-Physikalisches Institut, Friedrich-  
Schiller-Universität Jena, Jena, Germany

We are used to describe and understand physical processes in terms of energy density and energy current density. But what about gravity? Applying a special setting, it will be shown that the Newtonian gravitational field does not allow the definition of physical energy density or energy current density. The special setting is a natural outcome of Einstein's general relativity theory where gravitational energy density and energy current density, i. g., are also notions without physical meaning. Only to gravitational waves, which are completely foreign to Newtonian gravity, energy density and energy current density can be attributed physical meaning, at least to some extent. The Einstein equivalence principle and tidal forces, which are the true gravitational forces, will make the non-localizability of the gravitational field energy evident. Energy in cosmology will also find a discussion.