Contribution ID: **1155** Type: **Oral (Non-Student) / orale (non-étudiant)**

Relativistic Geoids

Tuesday 14 June 2016 14:00 (15 minutes)

In non-relativistic physics a geoid is a surface of constant gravitational potential. Here I propose, in the context of general relativity, the notion of a geoid – a surface of constant "gravitational potential". This idea emerges as a specific choice of a previously proposed, more general and operationally useful construction called a quasilocal frame – that is, a choice of a two-parameter family of timelike worldlines comprising the worldtube boundary of the history of a finite spatial volume. I describe the geometric properties of these geoid quasilocal frames, and construct solutions for them in some simple spacetimes. These results are then compared to their counterparts in Newtonian gravity and compute general relativistic corrections to some measurable geometric quantities. This work may have applications in applied geodesy.

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Session Classification: T2-7 Gravity, Astrophysics and Cosmology (DTP) / Gravité, astrophysique et cosmologie (DPT)

Track Classification: Theoretical Physics / Physique théorique (DTP-DPT)