Contribution ID: **13** Type: **Oral presentation**

Cosmological properties of gravitational torsion, torsion-fermion interactions and their observation in terrestrial laboratories

Wednesday, 13 September 2017 14:20 (20 minutes)

Torsion is a geometrical characteristic of a curved spacetime, which is additional to a metric tensor. In the standard form of the Eistein-Cartan gravitational theory it is shown that the contribution of torsion to the Einstein equations can be interpreted in terms of the torsion energy-momentum tensor. A requirement of its local conservation in a curved spacetime with an arbitrary metric or an arbitrary gravitational field demands a proportionality of the torsion energy-momentum tensor to a metrictensor, a covariant derivative of which vanishes because of the metricity condition. This fulfill a requirement of local conservation. The coefficient of proportionality can be identified with the cosmological constant. This allows to claim that torsion can serve as a geometrical origin i) for vacuum energy density, given by cosmological constant or dark energy density in the Universe, and ii) for Big Bang because of its negative pressure. This is a model-independent result, which is also valid in the Poincaré gauge gravitational theory by Kibble (T. W. B. Kibble, J. of Math. Phys., 2, 212 (1961)). In terrestrial laboratories torsion can be probed through torsion-fermion low-energy interactions.

Primary author: Prof. IVANOV, Andrei (Atominstitut, TU Wien)

Co-author: WELLENZOHN, Markus (FH Campus Wien, University of Applied Sciences)

Presenters: Prof. IVANOV, Andrei (Atominstitut, TU Wien); WELLENZOHN, Markus (FH Campus Wien, University of Applied Sciences)

Session Classification: Parallel P5 & P6

Track Classification: Precision experiments with cold neutrons