

EP 12: Grundlagenphysik

Time: Thursday 11:30–12:30

Location: H46

Invited Talk

EP 12.1 Thu 11:30 H46

Initiative for Basic Research in Space — ●GREGOR MORFILL — Max-Planck-Institut für extraterrestrische Physik, Giessenbachstrasse 85748 Garching

A brief summary of the most interesting fundamental physics topics is presented that could benefit significantly from research conducted in space (or that could only be carried out in space). These topics are sufficiently broad and important that the Community of Physicists may feel it necessary and opportune to start an initiative designed to identify and define a new programme of excellence in research in space. The talk finishes with a step-by-step plan how to proceed with such an initiative following an appropriate call for action and mandate by DPG.

EP 12.2 Thu 12:00 H46

The flyby-anomaly — ●HANSJÖRG DITTUS and CLAUS LÄMMERZAHN — ZARM, Universität Bremen

During flybys at Earth satellites experience an unexplained increase in the velocity of a few mm/s. The corresponding data are presented. A very rough and preliminary interpretation gives the impression that the effect depends in a characteristic way on the eccentricity of the orbit of the satellite. A discussion of various possible errors shows that no convincing reason for the observed velocity increase can be found.

Theoretical models which are able to describe the effect are however incompatible with the stability of bound satellite orbits; as a consequence, until now no convincing model for the observed phenomenon could be given.

EP 12.3 Thu 12:15 H46

Local spacetime dynamics and the PIONEER anomaly — ●HANS JÖRG FAHR and MARK SIEWERT — Argelander Institut für Astronomie, Univ.Bonn, Auf dem Hügel 71, 53121 Bonn

Propagation of electromagnetic radiation within the heliosphere should be influenced by the dynamics of the local spacetime metric. The latter, however, is an outstanding problem of General Relativity up to now. Assuming that the general Robertson-Walker like expansion of the universe also takes place on heliospheric scales, would lead to a frequency shift of radiosignals communicated between the Pioneer spacecraft and the earth which perfectly explains the observed frequency shift by its magnitude, but not by its sign, i.e a redshift instead of the observed blueshift should result. We investigate some alternatives to the full Robertson-Walker expansion and introduce a local scale function describing the development of the local density contrast with respect to the average cosmic density. This function can be trimmed such that the Pioneer anomaly is explained as a local radiophoton blueshift.