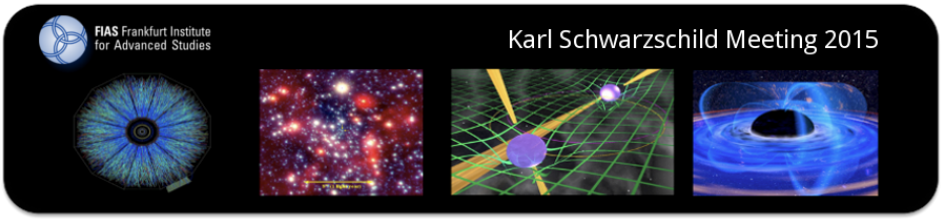

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Testing general relativity on accelerators

Monday, 20 July 2015 16:40 (20 minutes)

Within the general theory of relativity, the curvature of space-time is related to the energy and momentum of the present matter and radiation. One of the more specific predictions of general relativity is the deflection of light and particle trajectories in the gravitational field of massive objects. Bending angles for electromagnetic waves and light in particular were measured with a high precision. However, the effect of gravity on relativistic massive particles was never studied experimentally. In this talk, we propose and analyse experiments devoted to that purpose. We demonstrate a high sensitivity of the laser Compton scattering at high energy accelerators to the effects of gravity. The main observable – maximal energy of the scattered photons – would experience a significant shift in the Earth's gravitational field even for a tiny deviation from the current theoretical expectations. We confirm predictions of general relativity for ultrarelativistic electrons of energy of tens of GeV at a current level of resolution and expect our work to be a starting point of further high-precision studies on current and future accelerators, such as PETRA and ILC.

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