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Space astrometry with Gaia and relativistic astrophysics

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Esa's second space astrometry mission Gaia was launched in December 2013 and after an extended commissioning period started its scientific operations in July 2014. After 17 months of observations Gaia delivered an immense dataset of high-accuracy positional observations. In spite of some unexpected difficulties with the instrument, Gaia Data Processing and Analysis Consortium is progressing well towards first data releases scheduled for 2016.

This presentation will review the promises and challenges of Gaia space astrometry in the field of relativistic astrophysics. Potential applications of Gaia astrometry in this field range from weak-field tests of general relativity in the gravitational field of solar system to estimates of energy flux for gravitational wave background in a certain frequency domain. Space astrometry can also be used to provide model-independent estimates of the masses of invisible components in some known compact binary systems. The review of these Gaia promises will be accompanied by a critical analysis of the actual performance of the instrument.

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