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Weighing spacetime along the line of sight using times of arrival of electromagnetic signals

Wednesday, 7 July 2021 10:50 (20 minutes)

I will discuss a new method of determining the spacetime curvature and matter density along the line of sight using variations of times of arrival (TOA) of electromagnetic signals, measured in the vicinity of two given points. We measure the variations of the TOA's up to quadratic order in the displacements of the source and the receiver with the help two groups of synchronised clocks, equipped with transmitters and receivers. The TOA's are affected by the gravitational field along the lone of sight and it turns out that it is possible to determine from this data the first two moments of the matter density profile along the line of sight. The measurement is insensitive to the states of motion of the two groups of clocks, their angular positions or the influence of masses off the line of sight. Potential applications include precise binary pulsar timing and dark matter search. The talk is based on arXiv:2102.00095 [gr-qc].

Primary authors: KORZYNSKI, Mikolaj (Center for Theoretical Physics, PAS Warsaw); Mr MISKIEWICZ, Jan (Center for Theoretical Physics, PAS); SERBENTA, Julius (Center for Theoretical Physics Polish Academy of Sciences)

Presenter: KORZYNSKI, Mikolaj (Center for Theoretical Physics, PAS Warsaw)

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