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**EFFECTS OF THE FIRST GAIA DATA RELEASE ON ORBIT DETERMINATION  
AND IMPACT MONITORING OF NEAR-EARTH ASTEROIDS**

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**ABSTRACT**

The ESA Gaia mission has recently published the Data Release 1 (GDR1)[1] containing different data-sets of stellar astrometry. Based on a first calibration to be improved by future releases, GDR1 already represents an enormous upgrade in our knowledge of the sky. Roughly quantified as a factor  $\sim 10$  in accuracy, this achievement opens immediate perspectives of scientific exploitation in many branches of astrophysics [2].

Gaia is also directly measuring asteroid positions with unprecedented accuracy (few mas at  $V=20$ ), that will appear in forthcoming data releases.

GDR1 is completely changing our approach to asteroid observations, because now the limiting factor is so far given by the signal to noise ratio (SNR) and not by stellar catalogs. The consequences on orbit determination and impact monitoring are enormous, not to consider on the determination of non-gravitational perturbations as the Yarkovsky effect. When Gaia observations will be available, and a new debiasing and weighting scheme [2] will be done starting from future Gaia data releases, the combination of ground-based and Gaia data will be easier. For now, we analyze special objects using only observations reduced with GDR1, or objects which have required a specific and detailed study to combine ground-based and observations reduced with GDR1. We have already investigated the case of 2016 EK85, a Near-Earth Asteroid

(NEA) which has been on the risk list for few weeks. We are also analyzing the list of NEAs with quasi-measurable Yarkovsky effect [4], i.e. for which the SNR of the Yarkovsky drift is close to 3, to see if there are possible cases to be studied using GDR1.

## References

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