# The expected Gaia revolution in asteroid science: Photometry and spectroscopy

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Gaia is expected to produce a major revolution in our knowledge of the asteroids. Apart from a huge improvement in the accuracy of the orbital elements of these objects, something which is a "natural" consequence of the unprecedented astrometric accuracy of Gaia, we can also expect that the photometric and spectrophotometric performances of the Gaia detectors will be such to substantially move ahead the frontier of the domain of physical characterization of asteroids by means of remote observations.

A list of physical properties, that will be derived from the analysis of the detections corresponding to different observed transits of each object in the Gaia focal plane during five years of operational activity, includes masses, sizes, average densities, spin properties, reflectance spectra, albedos, as well as a new taxonomic classification. In this review, the focus will be on Gaia photometry and spectrophotometry. The method of photometric inversion of sparse photometric data developed to reduce Gaia photometric data of asteroids will be described, and its expected performances will be discussed. In particular, the choice of assuming for the objects the shapes of ideal triaxial ellipsoids, fairly simplistic in an era in which much more refined shape models are currently used in photometric inversion methods, will be justified by the need of minimizing the CPU time needed to process data for hundreds of thousands of objects in a reasonable time.

The processing of spectrophotometric data will be also described. These data will produce a huge data set of reflectance spectra of asteroids. A particular advantage of these data will be that of including also the blue part of the spectrum, which has been substantially lost since the epoch in which the CCD detectors have replaced the older photomultipliers used for UBVRI photometry. The big data set of new asteroid spectra will be also used to develop a new asteroid taxonomy, used new algorithms developed for this purpose. Coupled with the determination of reasonably accurate masses and bulk densities for the biggest 100 asteroids, Gaia data will open a new era in asteroid science, and will allow us to answer some fundamental questions, including the relation between internal structure and surface properties. The resulting post-Gaia scenario in asteroid science will be very much improved with respect to the current state of the art.

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