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Clues to links between some meteorites and the asteroidal targets of Rosetta, from comparisons between polarimetric measurements on meteoritic samples and observations

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Light scattering studies of various meteorites, including meteorites whose parent bodies might belong to the same types as the rare asteroids Steins and Lutetia, have been carried out under Earth gravity and microgravity conditions. The dependence of the linear polarization upon the phase angle and wavelength, as measured for samples of selected powdered meteorites, is compared to the results of polarimetric observations of surfaces of both asteroids, which somehow provide signatures of their regolitic layers, and with the properties revealed by the Rosetta flybys.

The results obtained on an aubrite meteorite agree with the polarimetric observations of 2867 Steins and of other E-type asteroids; the value of the derived geometric albedo is consistent with the disk-integrated geometric albedo of the asteroid. The results obtained on a CV3 carbonaceous chondrite are consistent with the polarimetric observations of 21 Lutetia; these observations noticeably differ from those of M- and C-type asteroids. Similar studies are anticipated to be developed for other asteroids and comets, with emphasis on comet 67P/Churyumov-Gerasimenko.

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