Flux densities of meteoroids derived from optical double-station observations

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Knowing the flux densities of meteoroid streams and the sporadic background is important for example to constrain meteoroid models. These are used by space agencies to design proper shielding of their spacecraft. Flux densities from meteoroid streams allow to constrain the ejection process at the comet. And knowing the flux densities of the sporadic meteoroid complex will allow to better understand where the particles come from.

Previously, meteoroid models have been mainly based on radar observations, counts of microcraters on lunar samples, and in-situ dust detector measurements. We have developed a method to de-bias optical observations to allow the results be used to constrain meteoroid models. We use the de-biasing method to derive flux densities based on observations done from 2012 to 2015 with our CILBO double-station setup in the Canary Islands (CILBO = Canary Island Long-Baseline Observatory).

Our main conclusions are: All meteors with masses larger than 1 g are observed; the resulting flux densities as a function of mass are consistent with the flux densities derived by Grün et al. (1985) but vary by about one order of magnitude around the Grün distribution, depending on which luminous efficiencies are assumed in the conversion from velocity and magnitude to mass. The unknown luminous efficiencies are the largest uncertainty still left.