Hayabusa2 mission target asteroid (162173) 1999 JU_3: Searching for the object's spin-axis orientation

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The JAXA Hayabusa2 mission was approved in 2011 with launch planned for late 2014. Arriving at the asteroid (162173) 1999 JU_3 in 2018, it will survey it, land, and obtain surface material, then depart in late 2019, and return to the Earth in December 2020. We observed the near-Earth asteroid 1999 JU_3 with the Herschel Space Observatory in April 2012 at thermal far-infrared wavelengths, supported by several ground-based observations to obtain optical lightcurves. We re-analyzed previously published Subaru-COMICS observations and merged them with existing data sets from Akari-IRC and Spitzer-IRS. In addition, we used the object's near-IR flux increase from February to May 2013 as observed by Spitzer. The almost spherical shape and the insufficient quality of lightcurve observations forced us to combine radiometric techniques and lightcurve inversion in a new way to find the object's spin-axis orientation, its shape, and to improve the quality of the key physical and thermal parameters of 1999 JU_3. We will present our best pre-launch solution for this C-class asteroid, including the sense of rotation, the spin-axis orientation, the effective diameter, the geometric albedo, and thermal inertia. The finely constrained values for this asteroid serve as an important input for the preparation of this exciting mission.