

Solar Diameter with the Smartphone's Ghost Images

AAS Eclipse Workshop Sept 29-30, 2023 Costantino Sigismondi sigismondi@icra.it
San Antonio, TX

1. The Sun is too bright for every smartphone's camera settings, ISO 100 and EV=-2, excepted at sunset/sunrise (Ostia, Cristoforo Colombo Rotunda).

3. During the eclipse, its ghost image shows the lunar profile progressing. 25 October 2022 partial eclipse, Rome S. Maria degli Angeli e dei Martiri.

2. The ghost image is always present with the Sun, much fainter than the Sun (Vatican Obelisk)

4. Baily beads dis/appearance are matched with the Kaguya lunar profile (2009) and the lunar position to get the solar diameter beyond the diffraction limit, because in 0.01 s the Moon covers ~ 0.003 arcsec angle over the Sun.

7. For data useful to recover 0.01 arcsec in solar diameter:

1. Fix the smartphone during video (tripode)
2. **No-stop** video of centrality 1 min before t2 to 1 min after t3
3. Fix manually ISO and EV at minimum
4. Get Geolocalization
5. Zoom max 4x
6. Make sure to include the ghost image at 4x
7. **Try all before the eclipse 3 times**

5. A short amateur video in [2023 hybrid eclipse in Western Australia](#) : see the ghost image below the Sun, and Jupiter up left (26-27). It was made on the real shadow's border, like Halley ([1715](#)) mentioned.

6. The frames of this video show no totality, with a single bead left, much brighter than Jupiter. The Corona and the beads are over-exposed, saturated, but not the ghost images.

8. **CITIZEN SCIENCE: All video authors will be credited in the task of solar diameter accurate measurement.** See Atlas of Baily Beads ([Solar Physics, 2009](#))

