# Constraints on the nucleus of comet C/2012 S1 (ISON) from the Hubble Space Telescope observations
# the Hubble Space Telescope observations

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Comet C/2012 S1 (ISON) was both a dynamically new comet, visiting the inner solar system for the first time since being scattered and deeply frozen in the Oort Cloud, and a sungrazing comet. This unique combination made it an attractive target for the Hubble Space Telescope. It was observed on 10 April 2013 when the comet was 4.15 au from the Sun, 4.24 au from the Earth, and at a phase angle of 13.7°, henceforth well before C/ISON crossed the "snow line" (2.5–3 au), avoiding strong activity driven by water-ice sublimation and, thus, potentially increasing the chance of detecting its nucleus. The observations were performed over three separate orbits spanning a time interval of 18 hours using the Wide Field Camera 3 (WFC3) UVIS detector to image C/ISON through two broadband filters, the "wide-V" F606W and "blue" F438W filters (Li at al. 2013). The twelve images obtained with the F606W filter were analyzed using our well-proven technique of fitting a parametric model of the expected surface brightness to the observed images (e.g., Lamy et al. 2006). The model consists of an unresolved point source and a coma specified by a power law, both convolved with the point spread function of the telescope. The nucleus is basically undetected, which imposes an upper limit of its radius of ∼0.3 km. However, the analysis is complicated by the so-called "breathing" of the WFC3 camera, an uncontrolled slight defocus which distorts the PSF. We investigated this question in detail and considered various cases of defocus. We will report on this effort and the resulting robust upper limit which we can put on the size of the nucleus of C/ISON.

**References:** Lamy, P. et al., A&A, 458, 669, 2006; Kelley, M.S., et al., AAS Meeting 223, abstr. 247.15, 2014; Li, J.-Y. et al., ApJ Let., 779, L3, 5pp, 2013.