Hubble Investigation of the B and G Fragments of Comet 73P/Schwassmann-Wachmann 3. H. A. Weaver[1], C. M. Lisse[1], M. Mutchler[2], P. L. Lamy[3], I. Toth[4], W. T. Reach[5], and J. Vaubaillon[5]. [1]The Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723 USA; (email: hal.weaver@jhuapl.edu),[2]Space Telescope Science Institute, Baltimore, MD USA, [3]Laboratoire d'Astrophysique de Marseille, Marseille, France, [4]Konkoly Observatory, Budapest, Hungary, [5]California Institute of Technology, Pasadena, CA USA

Introduction: Comet 73P/Schwassmann-Wachmann 3 (SW3) was discovered in 1930 and appeared to be a rather typical Jupiter-family comet with an orbital period of 5.4 yr. However, the nucleus of the comet unexpectedly fragmented into at least 3 separate objects in 1995, accompanied by large increases in both its visual brightness [1] and gas production rate [2]. Only the C and B fragments (C is considered the principal fragment) were definitively detected during the next apparition [3], and the 2006 apparition of SW3 was eagerly anticipated owing to the exceptionally favorable observing circumstances with the comet passing within 0.1 AU of the Earth in May 2006. Indeed, this apparition was nothing short of spectacular, with over 60 named fragments detected during the winter and spring of 2006. Following large brightness outbursts in late-March and early-April, our team was awarded Director's Discretionary Time on the Hubble Space Telescope (HST) to perform a detailed investigation of the continuing fragmentation of the B and G fragments.

Hubble Observations: We observed the B fragment three different times (2006 April 18.974, 19.773, and 20.773 UT) and discovered a swarm of sub-fragments trailing behind the principal nucleus. The locations and motions of the sub-fragments appear to be consistent with their release from the nucleus about one week prior to the observations, coincident with the brightness outburst reported by ground-based observers. The single observation of the G fragment on April 18.582 (Fig. 1) also showed a swarm of sub-fragments, consistent with release from the G fragment just a few days prior to the Hubble observations. In contrast, a single Hubble observation of the C fragment on April 18.630 did not reveal any new sub-fragments, consistent with the rather steady activity observed for the C fragment throughout early-April by both ground-based facilities and another Hubble program [4]. We examine in detail the morphology and kinematics of the continuing disintegration of the B and G fragments and compare the Hubble results to those obtained from earlier and later observations with the Spitzer Space Telescope to develop a more comprehensive understanding of the nucleus disruption process.

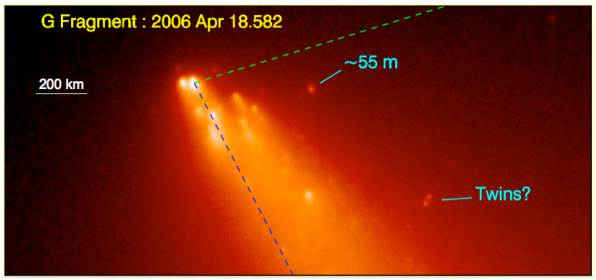

Fig.1: Hubble ACS/WFC image of 73P/SW3-G showing the continuing disintegration of this fragment, accompanied by a large increase in brightness. The blue dashed line (pointing mostly downwards) is the projected antisolar direction, and the green dashed line (pointing mostly to the right) shows the comet's orbital motion direction. In addition to a background of newly-released fine dust, many individual sub-fragments are also detected in the vicinity of the principal nucleus, and an estimated upper limit on the diameter of one of them is indicated on the image. We also point out two objects that seem to form a single pair of sub-fragments.

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References: [1] Boehnhardt, H. et al. (1995). *IAUC 6274*. [2] Crovisier, J., et al. (1996). *Astron. Astr., 310,* L17-L20. [3] Boehnhardt, H., et al. (2002). *EMP, 90,* 131-139. [4] Lamy, P. L., et al. (2008), ACM2008.