

OBSERVATIONS OF THE FRAGMENTED COMET
73P/SCHWASSMANN-WACHMANN 3

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The fragmented Comet 73P/Schwassmann-Wachmann 3 was observed using both the Arecibo (12.6 cm) and Goldstone (3.5 cm) planetary radar systems on 10 nights in May 2006. Although the disruption of a comet nucleus is not an impact process, it can lend valuable insights into the internal structure of these small icy bodies. We obtained radar spectra and images of both the comae and nuclei of fragments B and C. 73P is only the second comet whose nuclei have been imaged with radar and the first at sub-50-m resolution. We also obtained the first radar images of a cometary coma, which reveal a population of 2-cm particles and larger. The velocity distribution of these particles are size-dependent: smaller particles are moving at higher velocities. Spectral line observations of the OH in the coma for fragments B and C were also obtained, both at Arecibo and the 100m Green Bank Telescope. From the line width, we derive an average outflow velocity of 0.73 +/- 0.04 km/s of water from the nucleus. The outflow velocity from fragments B and C are indistinguishable between 17 April and 22 May 2006. We obtained images of the nuclei at resolutions as fine as 15 m per pixel. The delay-Doppler images of fragment C show it to be a rounded, somewhat irregular object approximately 2 km in diameter, with a firm lower limit of 1 km. There are clear indications of features, similar to craters and other topographical features seen in spacecraft images of other cometary nuclei. The images of fragment B, are unusual, but indicate a diameter no smaller than 400m. Since the gas production rates of fragments B and C are similar, the active area of fragment B must be much larger. This is not surprising since it is a fresher fragment. Both fragments are irregular in shape and have rotation periods longer than 10 hours.

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