# A RELATION OF OPTICAL AND X-RAY EMISSIONS IN HALE-BOPP *

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First evidence for a relation between the intensities observed in the optical and in X-rays was found from contemporary observations of Hale-Bopp in both spectral ranges. The optical observations were obtained with the 2.2 m MPG/ESO Telescope at ESO, La Silla, around 3.1 AU preperihelion from Sept. 10 to 17, 1996. Their calibration and analysis revealed that an outburst occured on Sept. 9, 1996, $11 \pm 2$ UT, which produced a cloud of material expanding through the coma. The cloud is visible in images obtained with a continuum filter and a CN filter. In the dust it can be followed from Sept. 10 to 17 whereas in CN it is detectable only from Sept. 10 to 12, 1996. The evolution of its intensity in both the dust and the CN is consistent with a Maxwellian velocity distribution at time of outburst. The fit of a Maxwellian function with two parameters (integrated intensity and average radius) resulted in a projected average expansion velocity of $204 \pm 6$ m/s for the dust and $608 \pm 22$ m/s for the CN (phase $\approx 19°$). A first estimate shows that during the outburst the dust production increased by a factor of $>7$ and the CN production by a factor of $<4$ relative to the quiescent level. The luminosity of the soft X-ray emission observed in Hale-Bopp with the *Beppo*SAX satellite on Sept. 10–11, 1996, was about an order of magnitude higher than that reported from EUVE observations on Sept. 14–19, 1996. This indicates that the outburst observed in the optical has probably triggered the increased X-ray emission on Sept. 10–11. If the variations in CN are representative for all gas production rates in Hale-Bopp, the outburst led to temporarily increased production rates that were about a factor of 2 higher in the dust than in the gas.

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