UPPER LIMITS ON THE C_{60} AND C_{60}^{+} ABUNDANCES IN THE INTERSTELLAR MEDIUM

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We present here the 1145 – 1475 cm^{-1} spectrum of the bright reflection nebula NGC 7023, a region where an interstellar molecular cloud is illuminated by ultraviolet radiation from a nearby star. Our astronomical observations are made with the Short Wavelength Spectrometer on the European satellite Infrared Space Observatory. Previous laboratory data show that two vibrational bands of the ionized fullerene C_{60}^{+} fall at 1331 and 1406 cm^{-1}, while two vibrational bands of the neutral fullerene C_{60} lie at 1190 and 1435 cm^{-1}. None of these bands are detected in our interstellar spectrum. We estimate an upper limit for the C_{60}^{+} abundance in this interstellar cloud of $< 0.3\%$ of the cosmic abundance of carbon, while C_{60} must be $< 0.2\%$ of the cosmic abundance of carbon.