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Can the anomalous X-ray pulsar 4U~0142+61 be described as an accreting white dwarf?

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The quiescent emission of the anomalous X-ray pulsar (AXP) 4U 0142+61 extends over a broad range of energy, from radio up to hard X-rays. In particular, this object is unique among soft gamma-ray repeaters (SGRs) and AXPs in presenting simultaneously mid-infrared emission and pulsed optical emission. In spite of the many propositions to explain this wide range of emission, it still lacks one that reproduces all the observations. In this poster, we present a model to reproduce the quiescent spectral energy distribution of 4U 0142+61 from mid-infrared up to hard X-rays using plausible physical components and parameters. We propose that the persistent emission comes from a magnetic accreting white dwarf (WD) surrounded by a debris disk. This model assumes that (I) the hard X-rays are due to the bremsstrahlung emission from the postshock region of the accretion column, (II) the soft X-rays are originated by hot spots on the WD surface, and (III) the optical and infrared emissions are caused by an optically thick dusty disk, the WD photosphere, and the tail of the postshock region emission. In this scenario, the fitted model parameters indicate that 4U 0142+61 harbors a fast-rotator magnetic near-Chandrasekhar WD, which is very hot and hence young. Such a WD can be the recent outcome of a merger of two less massive WDs. In this case, 4U 0142+61 can evolve into a supernova Ia and hence give hints of the origin of these important astrophysical events.

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