Strange Abundances in a White Dwarf Star: Evidence for Simultaneous Accretion of Rocky and Icy Bodies

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In a nutshell:

We found the first evidence for a white dwarf star consuming two distinct objects.
What is a White Dwarf Star?
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low- and medium-mass stars (including the Sun)

- main sequence
- red giant
- “planetary” nebula
- white dwarf

not to scale

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What is a White Dwarf Star?

- Final Stage of evolution
- Hot cores of sunlike stars
- Dense

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~30% are “polluted” by planetary material
White Dwarfs as a Planetary Laboratory
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A Strange Composition
A Strange Composition
A Strange Composition
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Core-forming

Element

Ni, Fe, Ca, S, P, Si, Al, Mg, O, N, C

Ice-forming
A Two Body Interpretation

• Mix of icy and rocky-metallic material

Best fit:
• 1 part icy KBO-like
• 1.7 parts metal-dominated Mercury-like
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Conclusions and Implications

- No solar system analog
- Simultaneous accretion of rocky and icy material
- Post main-sequence chaos
- Rocky and icy material are necessary for life

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