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Measured U isotopes and a new Pb-Pb age for the IVA iron Muonionalusta

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The 4565.3±0.1 Ma Pb-Pb age of troilite from the IVA iron Muonionalusta represents the lone highprecision absolute age of an iron meteorite [1]. This ancient Pb-Pb age mandates rapid cooling of the IVA core to ~300°C within ~2 Ma after CAI formation [1], and within <1 Ma after IVA core formation [2]. Such rapid cooling would require an extremely small parent body or the very early fragmentation of a still molten body. However, knowledge of the ²³⁸U/²³⁵U ratio is required for accurate Pb-Pb chronology, and recent work has shown significant variation in the ²³⁸U/²³⁵U ratio of many Solar System objects [e.g., 3], casting doubt on the previously reported Pb-Pb age. We report a $^{238}U/^{235}U$ measured ratio of ~137.2 Muonionalusta troilite, changing the previously reported Pb-Pb age by ca. -7 Ma. This new age has important implications for many aspects of early Solar System research, including planetary formation models, cooling rates of iron meteorites, and the Solar System initial ¹⁰⁷Pd/¹⁰⁸Pd.

[1] Blichert-Toft et al. (2010) *EPSL* 296, 469–480. [2] Kruijer et al. (2014) *Science* 344, 1150–1154. [3] Brennecka et al. (2010) *Science* 327, 449–451.

Cite abstract as:

Brennecka, G.A., Kleine, T. (2015) Measured U isotopes and a new Pb-Pb age for the IVA iron Muonionalusta. Paneth Kolloquium, Nördlingen (Germany), abstract URL:

http://www.paneth.eu/PanethKolloquium/2015/0021.pdf (abstract #0021).