THE ORIGIN OF ^{60}FE IN THE EARLY SOLAR SYSTEM. M. Gounelle. Laboratoire d'Étude de la Matière Extraterrestre, MNHN, 57 rue Cuvier, CP52, 75005 Paris, France (gounelle@mnhn.fr).

Short-lived radionuclei (SLRs) are radioactive isotopes with half-lives shorter than 100 Myr, which were present in the early solar system (ESS, [1]). Because of their relatively high abundances with respect to that of the interstellar medium (ISM), some SLRs must have been produced within, or close in space and time to the ESS rather than during continuous Galactic nucleosynthesis [2].

Iron-60 (mean life τ = 2.2 Myr) holds a special position because it is only produced efficiently by stellar nucleosynthesis unlike other SLRs, which can also be made in the protoplanetary disk via irradiation of dust/gas by accelerated energetic particles such as protons [3]. As such, ^{60}Fe provides important clues about the stellar environment of the ESS [4].

Two different quantitative scenarios involving *nearby, single* supernova (SN) were proposed whereby ^{60}Fe is injected either into the solar protoplanetary disk [5] or into the molecular cloud (MC) core progenitor of our solar system [6]. It is however extremely unlikely a SN lies close enough to a disk (and a core) to deliver SLRs at the level observed in the ESS [7, 8].

Recently a new model was proposed which suggested that iron-60 in the solar system was inherited in the progenitor molecular cloud from previous episodes of star formation in the solar neighborhood [9]. This model is based on the observation that a large number of moleculcar clouds are built by turbulent convergent flows created by supernovae explosions. The same supernovae explosions should carry ^{60}Fe and other short-lived radionuclides. The advantage of that model is that it is stochastic, as is star formation, and that it is generic, i.e. it has a non-zero probability. Recent observations of the Orion Nebular Cluster confirm that such enrichments can occur [10].

At the workshop, we will present the different models for the origin of iron-60 in the early solar system.

References: [1] S.S. Russell, et al., *Phi Trans. R. Soc.* 359 (2001) 1991.[2] B.S. Meyer & D.D. Clayton, *SSR* 92 (2000) 133.[3] T. Lee, et al., *ApJ* 506 (1998) 898.[4] T. Montmerle, et al., *EMP* 98 (2006) 39.[5] N. Ouellette, et al., *ApJ* 662 (2007) 1268.[6] A.G.W. Cameron, et al., *ApJ* 447 (1995) L53.[7] M. Gounelle & A. Meibom, *ApJ* 680 (2008) 781.[8] J.P. Williams & E. Gaidos, *ApJ* 663 (2007) L33. [9] M. Gounelle, et al., *APJL* 694 (2009) L1-L5. [10] d'Orazio et al. Astro-ph, arXiv:0905.1840