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Fermi edge singularity in a tunnel junction[1] JIN ZHANG, YURY SHERKUNOV, NICHOLAS D'AMBRUMENIL, BORIS MUZYKANTSKII, Department of Physics, University of Warwick — We present results on the non-equilibrium Fermi edge singularity (FES) problem in tunnel junctions. The FES, which is present in a Fermi gas subject to any sudden change of potential, manifests itself in the final state many body interaction between the electrons in the leads [1]. We establish a connection between the FES problem in a tunnel junction and the Full Counting Statistics (FCS) for the device [2]. We find that the exact profile of the changing potential (or the profile for the barrier opening and closing in the tunnel junction case) strongly affects the overlap between the initial and final state of the Fermi gas. We factorize the contribution to the FES into two approximately independent terms: one is connected with the short time opening process while the other is concerned with the long time asymptotic effect, namely the Anderson orthogonality catastrophe. We consider applications to a localized level coupled through a tunnel barrier to a 1D lead driven out of equilibrium [3]. References: [1] G. Mahan, Phys. Rev. 163, 1612 (1967); P. Nozieres and C. T. De Dominicis, Phys. Rev. 178, 1079 (1969); P. Anderson, Phys. Rev. Lett. 18, 1049 (1967) [2] J. Zhang, Y. Sherkunov, N. d'Ambrumenil, and B. Muzykantskii, ArXiv:0909.3427 [3] D. Abanin and L. Levitov, Phys. Rev. Lett. 94, 186803 (2005)

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