Strong core hole in resonant inelastic x-ray scattering (RIXS)[1]

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— We apply a lattice version of Mahan, Nozières, and de Dominicis theory[1] to RIXS calculations to understand the role of the core hole. The model reproduces the decomposition of the RIXS spectrum into well- and poorly-screened components. While the calculation can reproduce the full multiband spectrum, single pair excitations contribute the dominant part to the RIXS spectrum, and they can be described as the dynamic structure function $S(q,\omega)$ dressed by matrix element effects. We find evidence for an edge singularity at the RIXS threshold, similar to that found in x-ray absorption. We will discuss comparisons with long core hole lifetime calculations, and extensions to a system with antiferromagnetic order. 1. G.D. Mahan, Phys. Rev. **163**, 612 (1967); P. Nozières and C.T. De Dominicis, *ibid.* **178**, 1097 (1969).

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