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Fermi-edge singularity in a spin-incoherent Luttinger liquid[1]
GREGORY A. FIETE, California Institute of Technology — We theoretically investigate the Fermi edge singularity in a spin incoherent Luttinger liquid. Both cases of finite and infinite core hole mass are explored, as well as the effect of a static external magnetic field of arbitrary strength. For a finite mass core hole the absorption edge behaves as $(\omega - \omega_{\rm th})^{\alpha}/\sqrt{|\ln(\omega - \omega_{\rm th})|}$ for frequencies ω just above the threshold frequency $\omega_{\rm th}$. The exponent α depends on the interaction parameter g of the interacting one dimensional system, the electron-hole coupling, and is independent of the magnetic field strength, the momentum, and the mass of the excited core hole (in contrast to the spin coherent case). In the infinite mass limit, the spin incoherent problem can be mapped onto an equivalent problem in a spinless Luttinger liquid for which the logarithmic factor is absent, and backscattering from the core hole leads to a universal contribution to the exponent α.

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