Hydrodynamic limit of one dimensional subdiffusive exclusion processes with random conductance

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Consider a system of particles performing nearest neighbor random walks on the lattice $\mathbb{Z}$ under hard–core interaction. The rate for a jump over a given bond is direction–independent and the inverse of the jump rates are i.i.d. random variables belonging to the domain of attraction of an α–stable law, $0 < \alpha < 1$. This exclusion process models conduction in strongly disordered one-dimensional media. We prove that, when varying over the disorder and for a suitable slowly varying function L, under the super-diffusive time scaling $N^{1+1/\alpha}L(N)$, the density profile evolves as the solution of the random equation $\partial_t \rho = \mathcal{L}_W \rho$, where $\mathcal{L}_W$ is the generalized second-order differential operator $\frac{d}{du}\frac{d}{dW}$ in which W is a double sided α–stable subordinator. This result follows from a quenched hydrodynamic limit in the case that the i.i.d jump rates are replaced by a suitable array $\{\xi_{N,x} : x \in \mathbb{Z}\}$ having same distribution and fulfilling an a.s. invariance principle. We also prove a law of large numbers for a tagged particle.