# SPECTRAL GAP FOR ENERGY EXCHANGE MODELS WITH RATE FUNCTIONS APPROACHING ZERO

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Abstract. To derive Fourier's law of heat transfer from systems that originate from deterministic models, a class of locally confined particles in interaction has recently been studied intensively. As a generalization of mesoscopic stochastic models (also referred to as master equations) of them, A. Grigo, K. Khanin and D. Szasz introduced a class of stochastic models described as follows: Consider a chain of $N$ particles each carrying energy $x_i$, which is a positive real number. The energies of particles evolve according to a continuous time, pure jump Markov process, which conserves the total energy. For each nearest neighbor pair of particles $(i, i+1)$, an independent exponential clock with a rate $\Lambda(x_i, x_{i+1})$ is associated. When one of the clocks, say for the pair $(i, i+1)$, rings, then pick a number $0 \leq \alpha \leq 1$ according to a distribution $P(x_i, x_{i+1})$ and redistribute the energy $x_i + x_{i+1}$ to particles $i$ and $i+1$ with ratio $\alpha$. Namely, the new energy of particle $i$ is $\alpha(x_i + x_{i+1})$ and the new energy of particle $i+1$ is $(1-\alpha)(x_i + x_{i+1})$, and all other energies remain unchanged.

A. Grigo et al. proved a lower bound for the spectral gap under the assumption that $\Lambda(\cdot, \cdot)$ is uniformly bounded from below by a positive constant. In this talk, I present the spectral gap estimate for an entire class of the models with a rate function satisfying $\Lambda(a, b) \geq C(a+b)^m$ for some positive constant $C$ and $m \geq 1$ under the assumption that the process is reversible with respect to a family of product Gamma distributions.