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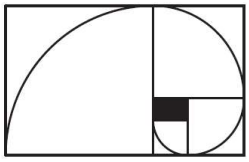

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# A two level contagion process and its deterministic McKendrick limit with relevance for the Covid epidemic

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**Abstract.** We introduce a stochastic epidemiological model, where two infection scenarios alternate. The first is infection within separate groups of finite size, the second is infection at meeting places of finite capacity, where individuals meet randomly. This can be thought of as an epidemic, where e.g. members of households regularly use public transport. For this model we derive the hydrodynamic limit: a McKendrick system with polynomial infections force.

**Keywords.** Jump processes on general state spaces, Interacting particle systems in time-dependent statistical mechanics, Epidemiology.

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