

## Mining networks of human contact with wearable sensors

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The availability of networked wearable devices is providing new ways to expose the mobility and the interactions of individuals. In this talk, I will focus on the SocioPatterns sensing platform, that achieves reliable detection of face-to-face interactions between individuals (see [www.sociopatterns.org](http://www.sociopatterns.org)). I will report on measurements carried out in a variety of contexts, from conferences to schools, to healthcare environments. The gathered datasets can be used to inform epidemiological models by giving access to contact matrices and contact networks, and to perform data-driven numerical simulations of epidemic phenomena.

In this context, I will consider the issue of the data representation: a too coarse data aggregation leads to too simplistic models, but the integration of highly detailed data sources yields models that are less transparent and general. I will consider various coarse-grained representations of the contact patterns occurring in a hospital ward. The simulations of disease spreading models in this community shows how the usual contact matrix representation, that only contains average contact durations between role classes, fails to reproduce the size of the epidemic obtained using the high-resolution contact data and to identify the most at-risk classes. I will introduce a contact matrix of probability distributions that takes into account the heterogeneity of contact durations between (and within) classes of individuals and show that it yields a good approximation of the epidemic spreading properties obtained by using the high-resolution data.