



Center for Soft Matter and Biological Physics

Discussion Meeting

Special Time

Dr. Johannes Zierenberg

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and Georg August University)**

**“Temporal Resonance Between Disease Progression and Contact
Patterns Shapes Epidemic Spread”**

Monday, July 12, 2021

3:00pm - 4:00pm

Virtual Zoom Link: <https://viriniatech.zoom.us/j/86043885866>

The spread of a contagious disease is clearly affected by the contact behavior of infected individuals. Previous modelling studies have highlighted both spatial aspects, such as influential spreaders, as well as temporal aspects, such as bursts of contacts. However, it remains unclear how the spatio-temporal contact behavior interplays with the temporal progression of a disease. Here, we use data from the Copenhagen Network Study to show that resonances between disease progression and temporal contact patterns shape epidemic spread. The temporal network of physical proximity generates, on the level of individuals, periods of statistically high or low encounter probability as a function of time from previous encounters. Considering previous encounters as potential times of infection, we find that the often-neglected latent period of a disease affects the number of potentially infectious encounters during an otherwise fixed infectious period by aligning the infectious period with periods of high or low encounter probability. We demonstrate that this resonance effect can be reproduced when describing individual contact patterns as inhomogeneous Poisson processes (temporal aspect) with heterogeneously distributed mean rates (spatial aspect). Focusing on the inhomogeneous temporal aspect in a mean-field spreading model, we show that resonances between disease progression and contact patterns affect the basic reproduction number and shape epidemic spread.

