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DK Seminar

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University of Vienna,
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A cross-diffusion model for ion transport

Ion transport can be modelled using the Poisson-Nernst-Planck (PNP) equations. In order to account for size exclusion effects in narrow ion channels, the PNP model can be modified leading to a cross-diffusion system. In this talk, we consider this modified PNP model and present some analytic and numerical results. We discuss how an entropy method can be applied to prove the global-in-time existence of weak solutions to the model. Furthermore, we introduce a finite volume discretization of the equations that conserves important model properties like entropy dissipation. Finally, some simulation results for a calcium-selective channel are shown.