

Rico Zacher

Title: Optimal decay estimates for non-local subdiffusion equations

Abstract: In my talk I will discuss recent results on the temporal decay of solutions to non-local in time subdiffusion problems like

$$\partial_t \int_0^t k(t-\tau)(u(\tau, x) - u_0(x)) d\tau - \operatorname{div}(A(t, x)\nabla u) = 0, \quad t > 0, x \in \Omega,$$

where  $k$  is a positive and non-increasing kernel that is singular at  $t = 0$ , and  $A$  is bounded and measurable and satisfies a uniform parabolicity condition. An important example is given by the time-fractional diffusion equation of time order  $\alpha \in (0, 1)$ . I will consider both the case of a bounded domain  $\Omega$  with homogeneous Dirichlet condition and the full space case  $\Omega = \mathbb{R}^d$ . In the case  $\Omega = \mathbb{R}^d$  the focus lies on the special case  $A = Id$ . The goal is to obtain optimal decay estimates for  $u(t)$  in  $L_p(\Omega)$ . It turns out that there are some fundamental and interesting differences to the classical heat equation. I will further comment on corresponding results for the time-fractional  $p$ -Laplace equation. This is partially joint work with Vicente Vergara (Tarapaca, Chile), Jukka Kemppainen (Oulu, Finland), and Juhana Siljander (Helsinki, Finland).