Egert, Moritz (Université Paris-Sud, France)

The Kato problem for parabolic systems in divergence form

Abstract: In my talk I will consider parabolic systems $L = \partial_t - \nabla_x \cdot A\nabla_x$ acting on the whole parabolic space $\mathbb{R}^{n+1}$. The coefficients A are bounded and allowed to depend measurably on time and all spatial variables. Surprisingly at first sight, L can be defined as a maximal accretive operator in $L^2(\mathbb{R}^{n+1})$ via a sesquilinear form on a natural energy space involving half-order time derivatives and first-order derivatives in space. Hence, there is a Kato square root type problem asking whether the domain of $\sqrt{L}$ coincides with the energy space. In a joint work with Pascal Auscher and Kay Nyström we answered this in the affirmative. More generally, we established the bounded holomorphic functional calculus for an associated perturbed parabolic Dirac operator. I will discuss key ideas of the proof and – if time allows – try to explain the main difficulties in passing to an L^p-theory of these operators.