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**Title of the talk:** Four Critical Numbers for Elliptic Systems with Block Structure

**Abstract:** We will discuss operators of the form $Lu = a^{-1} \text{div}_x (d \nabla_x u)$ on $\mathbb{R}^n$, where $a, d$ are bounded and accretive functions. Such multiplicative perturbations of divergence form operators with complex coefficients naturally arise as the boundary operator for the elliptic system

$$
\partial_t (a \partial_t u) + \text{div}_x (d \nabla_x u) = 0
$$

in block form in the upper half-space described by $t > 0, x \in \mathbb{R}^n$.

We explore the limitations of operator theory and harmonic analysis for $L$ in Lebesgue, Hardy and Sobolev spaces by asking questions of the following type. What is the largest set of exponents $p$ such that on $L^p$ the (i) Poisson semigroup $(e^{-t \sqrt{L}})_{t \geq 0}$ is bounded, (ii) $L$ has a bounded $H^\infty$-calculus, (iii) the Dirichlet problem for the system (*) is well-posed, (iv) the Riesz transform $\nabla_x L^{-1/2}$ is bounded? Four critical numbers keep appearing as the answer to all these (and many more) questions. The same numbers also encode the answer to questions of a seemingly very different type: For instance, certain critical numbers being strictly below $p = 1$ is equivalent to having Gaussian kernel bounds for the resolvents of $L$.

My talk is based on a recent monograph jointly written with Pascal Auscher.