Contribution ID: **3**   Type: **Invited talk**

On gradient stability in nonlinear PDE models and inference in interacting particle systems

Wednesday, March 4, 2026 9:00 AM (45 minutes)

We consider general parameter to solution maps $\theta \mapsto \mathcal{G}(\theta)$ of non-linear partial differential equations and describe an approach based on a Banach space version of the implicit function theorem to verify the gradient stability condition of Nickl & Wang (JEMS 2024) for the underlying non-linear inverse problem, providing also injectivity estimates and corresponding statistical identifiability results. We illustrate our methods in two examples involving a non-linear reaction diffusion system as well as a McKean–Vlasov interacting particle model, both with periodic boundary conditions. We apply our results to prove the polynomial time convergence of a Langevin-type algorithm sampling the posterior measure of the interaction potential arising from a discrete aggregate measurement of the interacting particle system.

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