Title: Inverse problems for partial differential equations, arising in imaging and medical tomography

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In modern medical and industrial imaging and in remote sensing, images cannot be measured directly but are reconstructed from other, measurable parameters by solving a so-called "inverse problem". Frequently, such a problem consists of finding a spatially varying coefficient of a partial differential equation (PDE) from the values of the solution measured at the boundary of a domain. Alternatively, some inverse problems can be formulated in terms of integral geometry.

A researcher working in the area of inverse problems is getting exposure to very diverse set of mathematical tools. In addition to theoretical and computational PDE's and integral geometry, one uses Fourier analysis, spectral theory, linear and abstract algebra, numerical methods, deep learning, and probability theory.

I will outline some of the simplest, classical inverse problems and indicate how they can be solved. Further, I'd like to present recent results of my group on mathematics of emerging modalities of biomedical imaging. In conclusion I plan to discuss some current work and interesting open problems.