

Seminario Matematico di Brescia

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Understanding the behaviour of Rational Ghosts

Thursday 12 May 2022
14.00

Online (Google Meet)

<http://meet.google.com/uib-axry-wsu>

Abstract: In Computerized Axial Tomography, the problem of reconstructing an unknown object from X-ray projections is considered. In real applications, the original theoretical model, based on the inversion of the Radon transform, must be refined for different reasons. Among them, the necessary constraint of using only a finite number of projections, which leads to the loss of injectivity of the Radon transform. This reflects in the appearance of ghosts, namely, non-trivial images having zero projections along all the considered directions. As a consequence, unique reconstruction can never be obtained, even from a theoretical point of view, without introducing some kind of prior knowledge, to be exploited for a better analysis of the structure of the space of ghosts.

In this regard, I will focus on the extra information that the set to be reconstructed has some degree of convexity. In particular, I will present some results concerning the geometric nature of hv-convex ghosts provided by sets of directions having rational slopes, as well as on their numerical characterization in terms of integer sequences, which leads to a complete understanding of their combinatorial structure

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