

International Seminar on Applied Geometry in Andalusia

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Stereology: The Combination of integral geometry and statistics to estimate geometric properties of real objects

Stereology is an interdisciplinary science which defines rules of geometric sampling to estimate quantities defined on spatial objects (e.g. biological, or mineral structures) such as volume, number of particles, surface area, length of curvilinear features, etc.

The lectures of L.M. Cruz-Orive will include:

1. Particular instances of Crofton's formulae in \mathbb{R}^3 for affine subspaces and for bounded geometric probes hitting a bounded submanifold.
2. Construction of test systems of affine subspaces and of bounded base equipped with motion invariant probability measures.
3. Application of a formula of L.A. Santalo to obtain fundamental stereological equations which supply the required estimators of geometrical parameters.
4. Example: Estimation of aggregate and individual mean volume, surface area, number, etc. of cells, from real vertical sections of a rabbit's articular cartilage, observed by light microscopy.

The lectures of X.Gual-Arnau will include:

1. The 'pivotal section formula' for convex sets in space forms. Applications to particle analysis.
2. A stereological version of the Gauss-Bonnet theorem. Application to estimate the Euler-Poincar characteristic of a geometrical structure.