Rational homotopy theory for singular spaces

Name: Dominik Wrazidlo

Heidelberg University
dwrazidlo@mathi.uni-heidelberg.de

Abstract: Many spaces arising in topology and geometry are not manifolds, but have singularities, so that essential tools like classical Poincaré duality are no longer available. To overcome this issue for the important class of stratified pseudomanifolds, Goresky and MacPherson introduced intersection homology that depends on an additional parameter called a perversity. They showed that the intersection homology groups of stratified pseudomanifolds satisfy a generalized form of Poincaré duality with respect to complementary perversities.

In this survey talk, I will present Banagl's method of intersection spaces that assigns generalized Poincaré duality spaces depending on a perversity to certain stratified pseudomanifolds by modifying only a neighborhood of the singular set. While the singular homology of intersection spaces is not isomorphic to intersection homology, both theories are related by mirror symmetry on Calabi-Yau 3-folds.

I will explain a promising perspective on intersection space theory from the viewpoint of rational homotopy theory that was recently introduced in [1, 2]. The focus of this talk lies on a survey of main ideas, examples, and possible future directions of research.

References

[1] D.J. Wrazidlo, *On the rational homotopy type of intersection spaces*, J. of Singularities **20** (2020), 251–273.

Free Access: `http://www.journalofsing.org/volume20/article11.html`

[2] D.J. Wrazidlo, *A fundamental class for intersection spaces of depth one Witt spaces*, manuscripta mathematica **166** (2021), 199–236.

Open Access: `http://link.springer.com/article/10.1007/s00229-020-01238-7`