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This is the Inaugural Lecture for BCAM-Severo Ochoa courses

Symplectic wars, part II: Flexibility strikes back

The history of symplectic topology is a history of war. It is an instance of the eternal war between geometry and topology. The geometry side claims that the symplectic world follows the rules of the complex projective geometry: a rigid world in which the different objects are completely static and the different “contact/symplectic” animals cannot be classified by just rough shapes. You have to define subtle –geometric– invariants, and they will produce many examples of “animals” lying in the same “topological jail”. Complex projective geometry is the model to mimic.

The topology team claims that there is no geometry. Each topological jails contain just one animal. The ideal instance is the world of differential topology: what differential topology puts as necessary condition for the objects to exist is also a sufficient condition.

The war has gone through different alternatives. The 60’s and 70’s of the XX century were the golden age of the topological side. Suddenly, at the beginning of the 80’s, Daniel Bennequin and Mikhael Gromov managed to prove that there was rigidity, that is to say that there were examples of “topological jails” with more than one animal. The following 90’s and 00’s witnessed the growth of the rigidity side in symplectic topology. The last 15 years have shown a come back of Symplectic Flexibility. I will briefly outline how the battle is ending in a remarkable case: the complete classification of 3-dimensional contact structures.

(matematika mugaz bestalde)