

**TEMAS DE INVESTIGACIÓN PARA ESTUDIANTES EN
LA ESCUELA JAE**

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CUP PRODUCTS AND QUASIMORPHISMS IN BOUNDED COHOMOLOGY

Cup products in bounded cohomology: Bounded cohomology is a powerful yet still mysterious invariant of groups. As is the case in usual cohomology, it is endowed with a cup product

$$\cup: H_b^k(G, \mathbb{R}) \times H_b^m(G, \mathbb{R}) \longrightarrow H_b^{k+m}(G, \mathbb{R})$$

for all $k, m \in \mathbb{Z}_{\geq 0}$. This cup product allows one to build higher degree classes from lower degree ones. However, even for the free group, the cup product in bounded cohomology is not completely understood yet. The aim of this project is to get to know the available results on the cup product in the bounded cohomology of the free group and, if time permits, to try to extend them further.

Quasimorphisms and bounded cohomology: Quasimorphisms on a group G are functions $f: G \rightarrow \mathbb{R}$ that satisfy

$$\exists D(f) \in \mathbb{R}_{\geq 0} \text{ s. t. } |f(g) + f(h) - f(gh)| < D(f) \forall g, h \in G.$$

Homomorphisms and constant functions are trivial examples. (Non-trivial) quasimorphisms play an important role in various fields of mathematics, such as the study of stable commutator length and low degree bounded cohomology. The aim of this project is to study various types of quasimorphisms on Gromov hyperbolic groups and understand their cup products.

Estoy dispuesta a tutorizar un máximo de 2 estudiantes.