

GROUP THEORY seminar

THE STRONG ATIYAH CONJECTURE FOR LOCALLY INDICABLE GROUPS

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ABSTRACT:

Let G be a group and assume that there exists a uniform bound for the orders of finite subgroups of G . Let $\text{lcm}(G)$ denote the least common multiple of these orders. Assume that G acts freely and cocompactly on a CW complex X . The strong Atiyah conjecture for G over \mathbb{Q} states that the L^2 -Betti numbers $\beta_i^{(2)}(X, G)$ belong to $\frac{1}{\text{lcm}(G)}\mathbb{Z}$. This conjecture admits an algebraic reformulation that also allows us to generalize it over an arbitrary subfield K of \mathbb{C} .

There are many different reasons to be interested in this conjecture.

- From a topological point of view it is important because it imposes a strong restriction on possible values of the L^2 -Betti numbers $\beta_i^{(2)}(X, G)$.
- In ring theory it implies that the group ring $K[G]$ can be embedded in a ring $\mathcal{R}_{K[G]}$ with a very particular structure. For instance, when G is torsion-free, the conjecture predicts that $\mathcal{R}_{K[G]}$ is a division ring. This is a strong version of the Kaplansky zero-divisor conjecture for $K[G]$.
- The conjecture has also importance in group theory. For example, P. Kropholler, P. Linnell and W. Lück showed that if G has homological dimension one and satisfies the strong Atiyah conjecture over \mathbb{Q} , then it is locally free, thus answering positively to a question formulated by R. Bieri.

During the last 25 years it has been shown that many families of groups satisfy the strong Atiyah conjecture. In this talk we will introduce the algebraic version of the strong Atiyah conjecture for a torsion-free group G , and we will show that it holds when G is locally indicable.

More info: <https://www.icmat.es/events/seminar/group-theory>