

On weakly reducible trisections of 4-manifolds

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A Heegaard splitting is weakly reducible if there are disjoint simple closed curves bounding disks in distinct handlebodies. In 1987, Casson and Gordon introduced the idea of a weakly reducible Heegaard surface and showed that, in most cases, 3-manifolds with weakly reducible Heegaard splittings contain essential surfaces. One dimension higher, trisections of closed 4-manifolds are determined by a triplet of three-dimensional handlebodies. In this talk, we extend the concept of weakly reducible diagrams to the context of trisections of 4-manifolds. We will classify all 4-manifolds that admit a genus-three weakly reducible trisection. Our work verifies Meier's conjecture on the classification of genus-three trisections. This work is joint with Alex Zupan.

In Special Session 31 on Structures of Submanifolds in Low Dimensional Topology at the Mathematical Congress of the Americas 2025.