TOPOLOGY SEMINAR

Topological methods for studying contextuality and Bell inequalities

By

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Abstract: Going back to the seminal work of J.S. Bell [1], and later A. Fine [2] and M. Froissart [3], it is possible to study the separation between noncontextual and contextual measurement statistics using polyhedral geometry. From this geometric point of view a distribution is termed noncontextual if it lies within the convex hull of so-called deterministic distributions, and contextual otherwise. The facet defining inequalities of this convex set are called Bell inequalities. In this talk we follow [4] and use the framework of simplicial distributions to derive Bell inequalities for the well-known N-cycle scenarios and their generalization, the flower scenarios first introduced in [4]. We restrict our attention to outcomes in integers mod 2. Our proof techniques utilize topological notions, such as gluing and extension, together with a topological interpretation of Fourier-Motzkin elimination, a common technique used in polytope theory.

References:
[1] J.S. Bell, On the Einstein Podolsky Rosen Paradox
[2] A. Fine, Hidden variables, joint probability, and the Bell inequalities
[3] M. Froissart, Constructive generalization of Bell's inequalities
[4] Kharoof, et al. Topological methods for studying contextuality: N-cycle scenarios and beyond

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Place: ZOOM

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