

Seminário Geral do CMUP

[CMUP General Seminar]

Tuesday, 31 October 2023, at 14:30, in room FC1-0.31

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TACTILE HYPERBOLIC GEOMETRY

The theoretical discovery of hyperbolic geometry first got its actual tactile example in 1868 when Eugenio Beltrami created a negatively curved surface from paper annuli and named it a pseudosphere. Later the name pseudosphere got attached to a surface created by a tractrix rotating around its axis. However, mathematicians found more useful for theoretical purposes using different, non-tactile models such as Klein or Poincare disc models or half-plane model. Those are traditionally used in college textbooks. However, to experience deeper understanding of hyperbolic geometry, these models were not enough for Bill Thurston when he was a college student. Since in 1901 Hilbert proved that hyperbolic plane cannot be described analytically in 3-space, Thurston together with his peers at informal seminar decided to make a tactile model of hyperbolic plane and created it by gluing together paper annuli without knowing about Beltrami's paper model created hundred years earlier. I learned about Thurston's model in 1997 and decided to make it more durable by crocheting it. Crocheted hyperbolic planes have turned out to be a useful tool in tactile explorations of hyperbolic geometry giving to theoretical knowledge a different perspective.