



THE UNIVERSITY  
of NORTH CAROLINA  
at CHAPEL HILL

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## Mathematics Colloquium

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### Knot theory and machine learning

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**Abstract.** The signature of a knot  $K$  in the 3-sphere is a classical invariant that gives a lower bound on the genera of compact, oriented surfaces in the 4-ball with boundary  $K$ . We say that  $K$  is hyperbolic if its complement admits a complete, finite volume hyperbolic metric. I will explain how we have used methods from machine learning to find an unexpected relationship between the signature and the cusp shape of a hyperbolic knot. This is joint work with Alex Davies, Marc Lackenby, and Nenad Tomasev.