

1154-57-1518

**Mark Clifford Hughes\***, 324 TMCB, Provo, UT 84602, and **Thomas Liddle, Jamison Moody** and **Spencer Reschke**. *Reinforcement learning for constructive proofs in knot theory*. Preliminary report.

Low-dimensional topology has numerous examples of problems whose solutions require constructing sequences of operations taken from a fixed set of moves. Examples include showing that two handle diagrams represent the same smooth 4-manifold by Kirby moves, trivializing a group presentation by Andrews-Curtis moves, or constructing slice surfaces of a knot by Morse modifications to a diagram. In this talk I will focus on this last problem, and discuss early results on how deep reinforcement learning may provide an avenue for constructing specific examples of genus minimizing slice surfaces, and computing the slice genus. In particular, I will describe the framework of deep Q-learning, as well as some recent enhancements such as dueling network architectures, prioritized experience replay, and asynchronous methods, and outline some results. (Received September 16, 2019)