Knot Invariants and Yang-Mills-Higgs Theory
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Abstract:

After describing some basic knot invariants and studying some examples, we shall
describe two geometric constructions computing them:

1. three-dimensional Chern-Simons gauge theory, that computing classical
   invariants called Jones polynomials, and

2. five-dimensional Haydys-Witten theory, that computes their quantum
   version called Khovanov homology.

Time permitting, we shall formulate the latter theory in terms of octonions and
obtain yet another, entirely new, seven-dimensional theory. Open problems
involving this seven-dimensional theory abound.