

What does the Alexander polynomial know about minimal surfaces?

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In 1928 Alexander defined a polynomial invariant of knots and links. It is combinatorial in nature and can be determined directly from a plane diagram of the link. I will explain a conjecture which says that the coefficients of the Alexander polynomial is in fact a count of minimal surfaces: we think of a link L as lying in the 3-sphere at infinity of hyperbolic 4-space and then count connected complete minimal surfaces in hyperbolic 4-space which have ideal boundary equal to L . If true, this would mean that the relatively simple combinatorial computation of the Alexander polynomial would imply the existence of minimal surfaces, so give solutions to a non-linear PDE! I will outline a strategy for the proof of this conjecture which goes via 6-dimensional symplectic geometry and J-holomorphic curves.