#### **Mathematical Physics**

# Proof of the Borwein-Broadhurst conjecture for a dilogarithmic integral arising in quantum field theory

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Borwein and Broadhurst, using experimental-mathematics techniques, in 1998 identified numerous hyperbolic 3-manifolds whose volumes are rationally related to values of various Dirichlet L series \$\textup{L}\_{d} (s)\$. In particular, in the simplest case of an ideal tetrahedron in hyperbolic space, they conjectured that a dilogarithmic integral representing the volume equals to \$\textup{L}\_{-7}(2)\$. Here we have provided a formal proof of this conjecture which has been recently numerically verified (to at least 19,995 digits, using 45 minutes on 1024 processors) in cutting-edge computing experiments. The proof essentially relies on the results of Zagier on the formula for the value of Dedekind zeta function \$\zeta\_{\mathbb{K}}(2)\$ for an arbitrary field \$\mathbb{K}\$.

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