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The Witten-Reshetikhin-Turaev invariants of finite order mapping tori II

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We identify the leading order term of the asymptotic expansion of the Witten-Reshetikhin-Turaev invariants for finite order mapping tori with classical invariants for all simple and simply-connected compact Lie groups. The square root of the Reidemeister torsion is used as a density on the moduli space of flat connections and the leading order term is identified with the integral over this moduli space of this density weighted by a certain phase for each component of the moduli space. We also identify this phase in terms of classical invariants such as Chern-Simons invariants, eta invariants, spectral flow and the rho invariant. As a result, we show agreement with the semiclassical approximation as predicted by the method of stationary phase.

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