A proof of a conjecture by Gukov-Pei-Putrov-Vafa

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In 2020, Gukov--Pei--Putrov--Vafa conjectured that Witten--Reshetikhin--Turaev (WRT) invariants are radial limits of homological blocks, which are q-series introduced by them for plumbed 3-manifolds with negative definite linking matrices. In this talk, I prove their conjecture with three key ideas: (1) To develop a new asymptotic formula by the Euler-Maclaurin summation formula. Then, we can compare asymptotic expansions of WRT invariants and homological blocks; (2) To prove that the conjecture is deduced from the holomorphy of a rational function defined by adding parameters for an expression of WRT invariants; (3) To prove the holomorphy by the induction on pruning of a plumbing graph.