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Lattice study on the twisted CP^{N-1} models on $R \times S^1$

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We here focus on CP^{N-1} models on $R \times S^1$ with the Z_N twisted boundary conditions, whose importance has recently been increasing in terms of resurgence theory, volume independence and its relation to 4D gauge theory. We have performed lattice simulations for the models with $N=3-20$ on several lattice sizes (e.g. 40×8 , 200×8 , 400×12), with emphasis on Polyakov loop, Casimir energy and fractional instantons. In the talk, we will show our results on phase transition associated with the expectation value of Polyakov loop and Casimir energy associated with the vacuum energy. We will also discuss the existence of $Q=1/N$ fractional instantons and bions, which play a pivotal role in the resurgent structure and the volume independence of the models.

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