

# Fluid model of black hole/string transition

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We propose a fluid model of self-gravitating strings. It is expected that black holes turn into strings around the end of black hole evaporation. The transition will occur near the Hagedorn temperature. After the transition, strings would form a bound state by the self-gravitation. Horowitz and Polchinski formulated a model of self-gravitating strings by using winding strings wrapping on the Euclidean time circle. We first show that winding strings in the Horowitz-Polchinski model approximately behave as a perfect fluid. Then, we solve the Einstein equation for the fluid of winding strings. Our solution reproduces behaviors of the self-gravitating string solution in the Horowitz-Polchinski model near the Hagedorn temperature, while it approaches the Schwarzschild black hole in low temperature. Thus, our fluid model of self-gravitating strings gives a description of the transition between black holes and strings.

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