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Finite-Temperature Relativistic Time-Blocking Approximation for Nuclear Strength Functions. HERLIK WIBOWO, Western Michigan University, ELENA LITVINOVA, Western Michigan University and National Superconducting Cyclotron Laboratory, Michigan State University — This work presents an extension of the relativistic nuclear field theory (RNFT) developed throughout the last decade as an approach to the nuclear many-body problem, based on QHD meson-nucleon Lagrangian and relativistic field theory. The unique feature of RNFT is a consistent connection of the high-energy scale of heavy mesons, the medium-energy range of pion, and the low-energy domain of emergent collective vibrations (phonons). RNFT has demonstrated a very good performance in various nuclear structure calculations across the nuclear chart and, in particular, provides a consistent input for description of the two phases of r-process nucleosynthesis: neutron capture and beta decay. Further inclusion of finite temperature effects presented here allows for an extension of the method to highly excited compound nuclei. The covariant response theory in the relativistic time-blocking approximation (RTBA) is generalized for thermal effects, adopting the Matsubara Green's function formalism to the RNFT framework. The finite-temperature RTBA is implemented numerically to calculate multipole strength functions in medium-mass and heavy nuclei. The obtained results will be discussed in comparison to available experimental data and in the context of possible consequences for astrophysics.

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