Bottomonia screening masses from $2+1$ flavor QCD

Sayantan Sharma

The Institute of Mathematical Sciences

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based on the work

P. Petreczky, SS, J. H. Weber, arxiv: 2107.11368

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- Within the Non-Relativistic QCD (NRQCD), it is now known from lattice studies that ground state $\eta_b(1s)$ melt at $T > 400$ MeV whereas the fate of 1P-bottomonia states is not yet completely settled. [G. Aarts et. al. 10, 14, S. Kim et. al., 14, 18, R. Larsen et. al., 18, 19.]

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- When there are well-defined bound state peaks in the spectral function the M_{scr} is simply the pole mass of the corresponding meson channel. At high T, the $M_{scr} = 2\sqrt{m_q^2 + (\pi T)^2}$.

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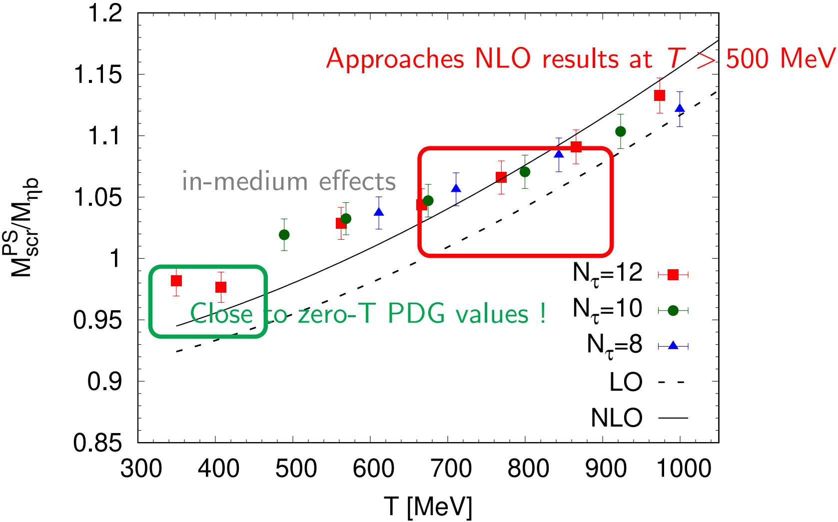
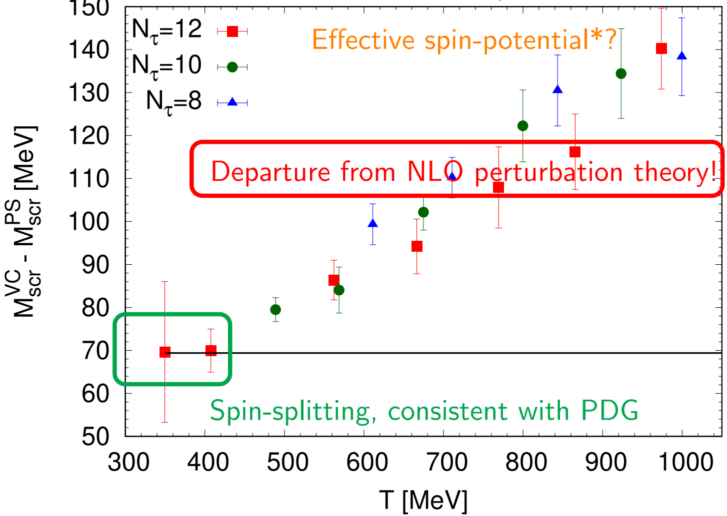
- Systematic uncertainty of $\sim 1\%$ in extracting bottomonium mass at zero-T through interpolation from earlier data of η_b vs m_b [Petreczky & Weber, 19]. Cut-off effects are much smaller than these systematic +scale setting+stat. errors!

Results: $\eta_b(1s)$ screening mass



Diff. between pseudo-scalar and vector M_{scr}

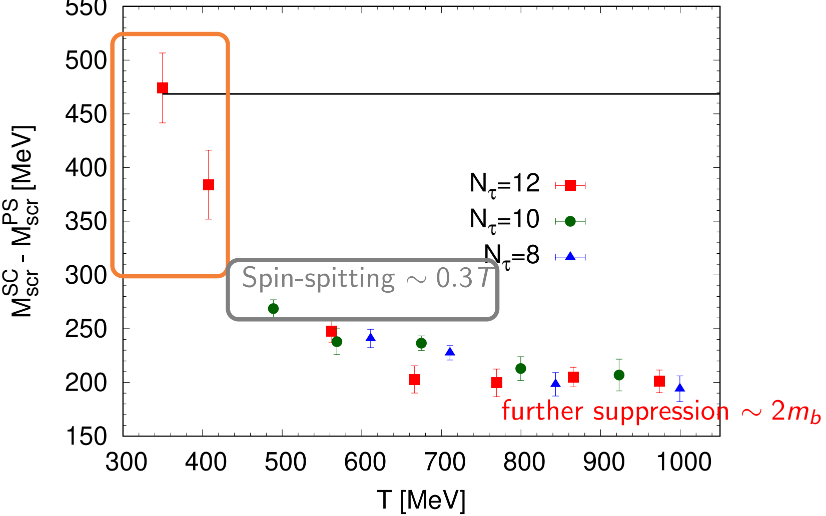
This observable insensitive to the quark mass effects.



[*V. Koch et. al., 92]

Diff. between scalar and pseudo-scalar M_{scr}

Scalar melts earlier than the vector states



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- For vector (Υ) and pseudo-scalar (η_b) screening masses thermal modifications show up at relatively higher temperatures $T > 500$ MeV, consistent with earlier lattice results using NRQCD.

- After the bottomonium states receive significant thermal broadening, $b - \bar{b}$ pairs remains correlated through a spin-dependent non-perturbative potential.