



Interplay between pseudogap, Van Hove singularity and entropy maximum in the CDMFT phase diagram of the 2D Hubbard model

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V30.00015 Room: 406B

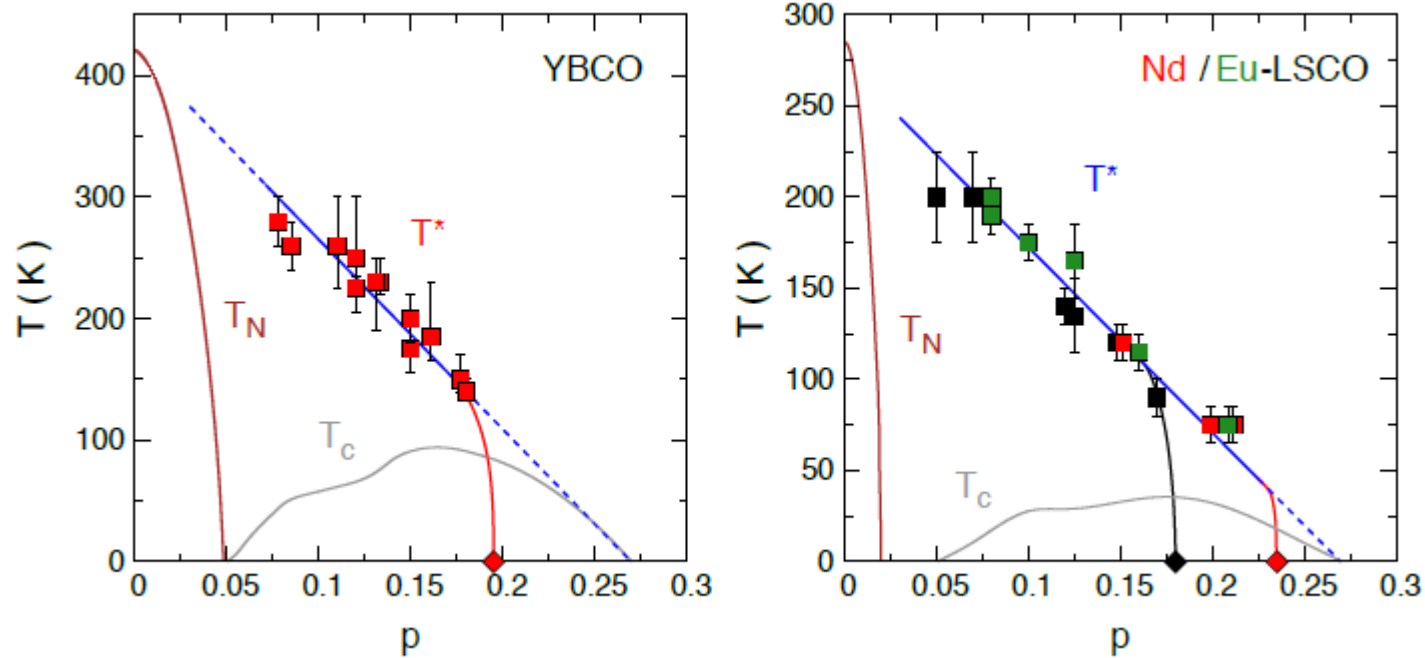
Thursday March 8, 5:18 PM



[USHERBROOKE.CA/IQ](https://usherbrooke.ca/iq)

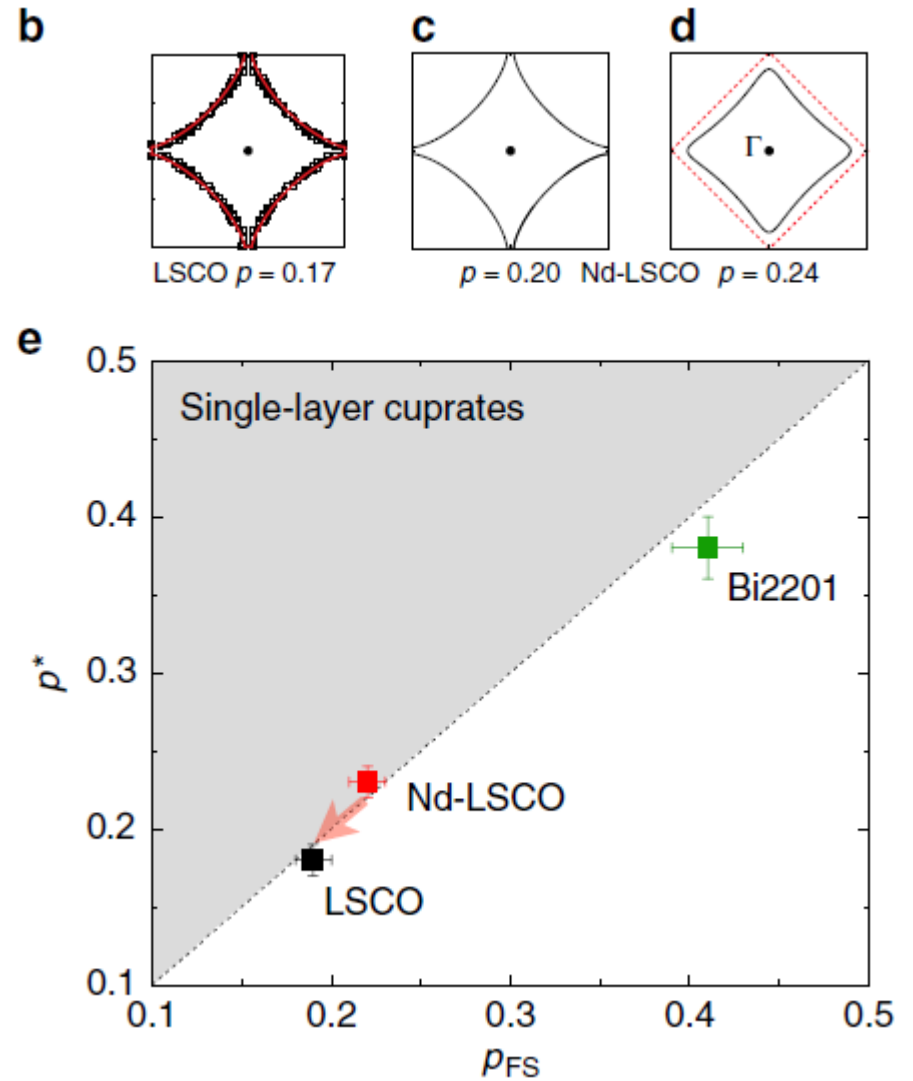
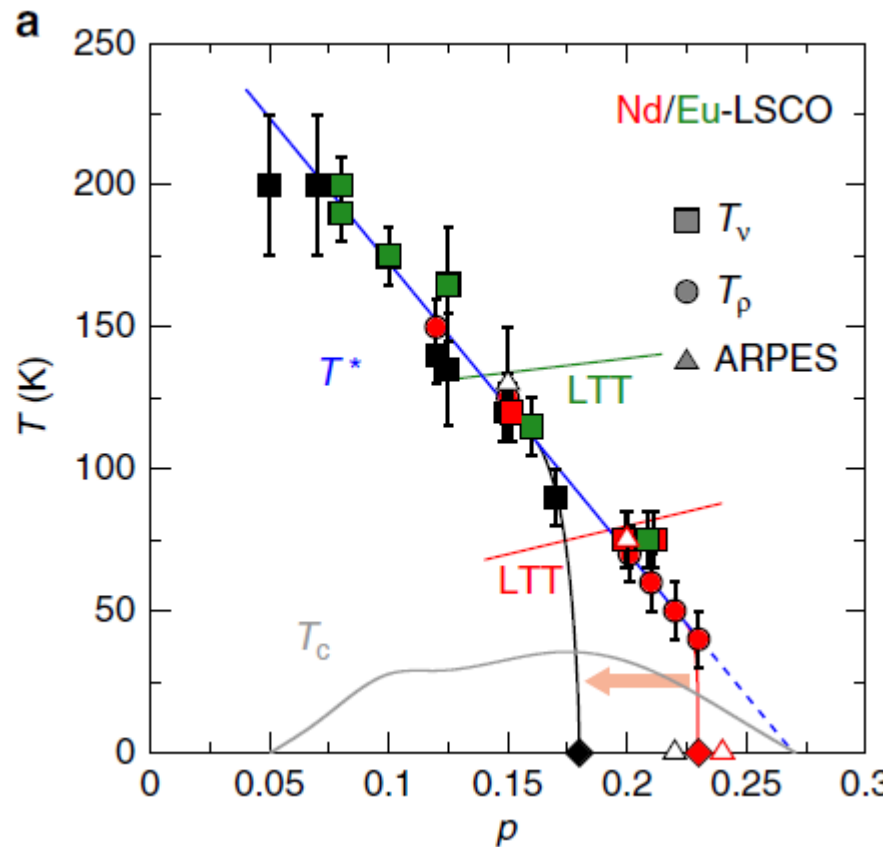
What are the problems?

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Cyr-Choinières et al. Phys. Rev. B **97**, 064502

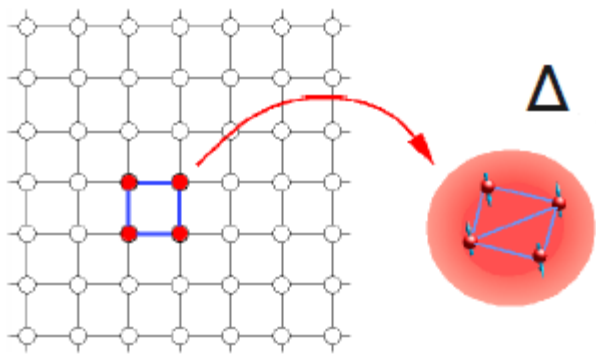
What are the problems?



Model and Method

$$\hat{\mathcal{H}} = - \sum_{\mathbf{k}, \sigma} \xi_{\mathbf{k}} \hat{c}_{\mathbf{k}\sigma}^{\dagger} \hat{c}_{\mathbf{k}\sigma} + U \sum_i \hat{n}_{i\uparrow} \hat{n}_{i\downarrow} - h \sum_i (\hat{n}_{i\uparrow} - \hat{n}_{i\downarrow})$$

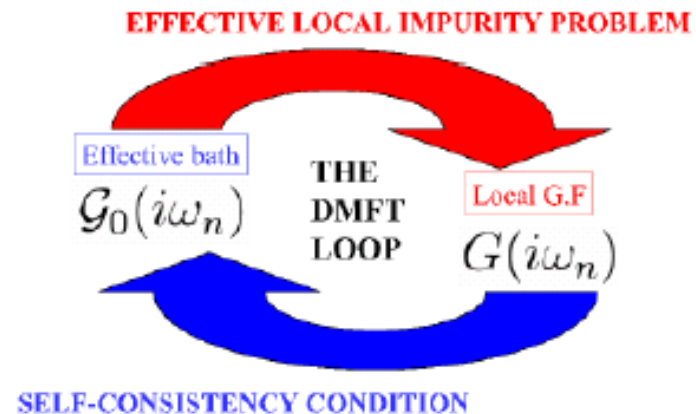
Method



Mean-field is not a trivial problem! Many impurity solvers.

Here: continuous time QMC

P. Werner, PRL 2006
 P. Werner, PRB 2007
 K. Haule, PRB 2007

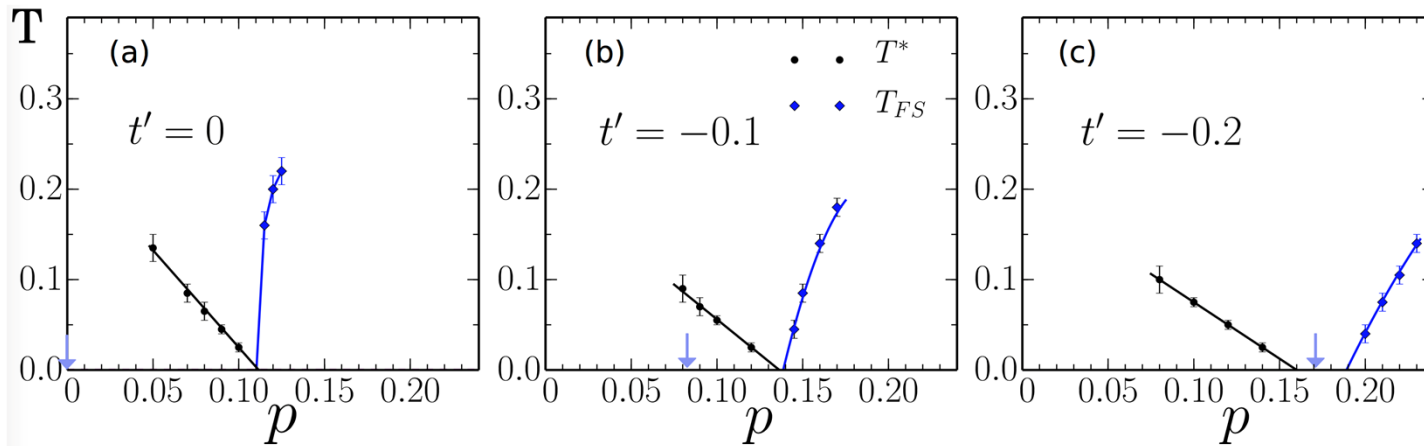


$$\Delta(i\omega_n) = i\omega_n + \mu - \Sigma_c(i\omega_n)$$

$$= \left[\sum_{\vec{k}} \frac{1}{i\omega_n + \mu - t_c(\vec{k}) - \Sigma_c(i\omega_n)} \right]^{-1}$$

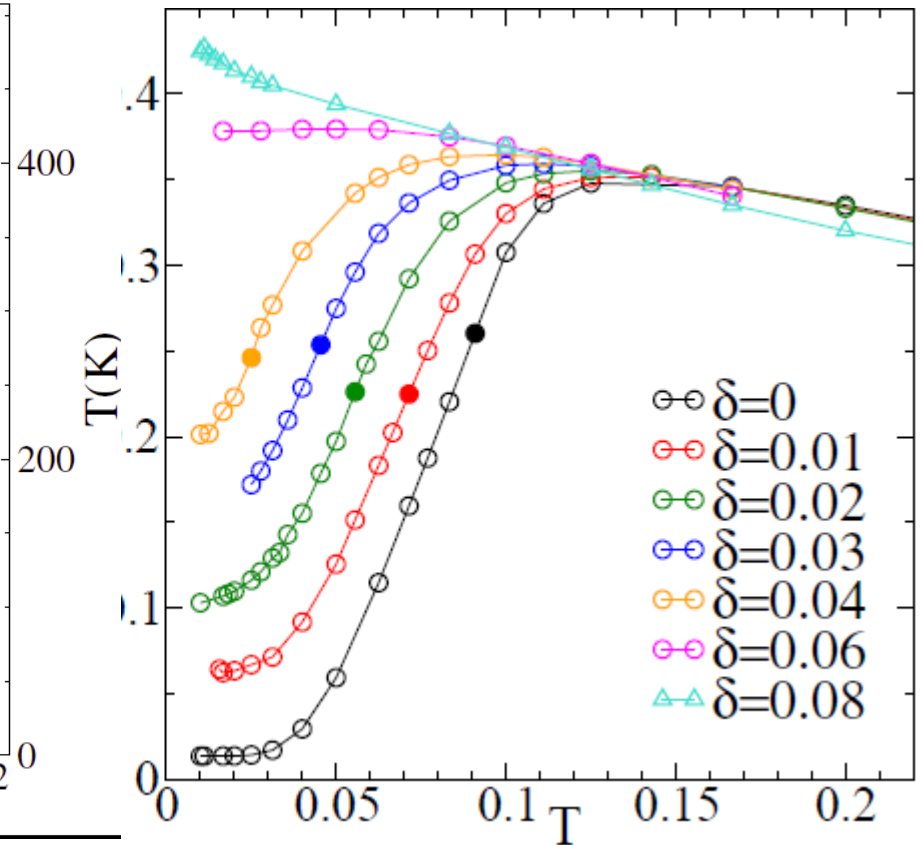
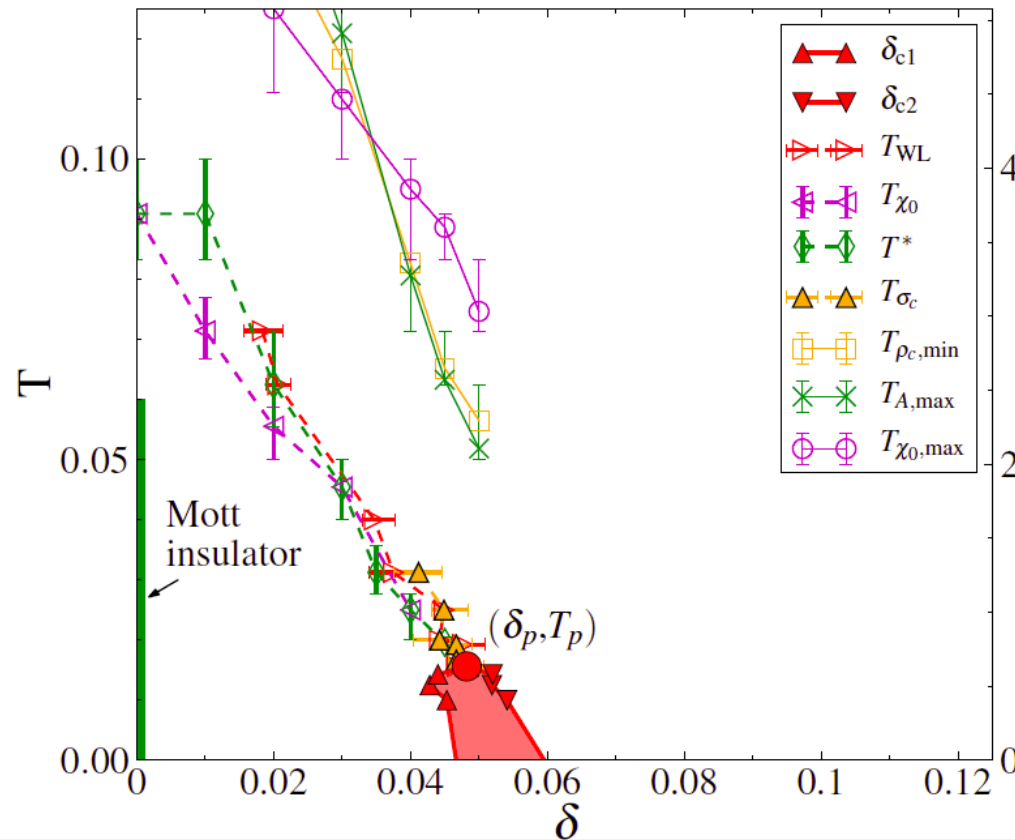
Previous results

Previous results ($U = 7t$ DCA)



W Wu, A Georges, M Ferrero - arXiv preprint arXiv:1707.06602

Previous results ($U = 6.2 t$, $t'=0$)

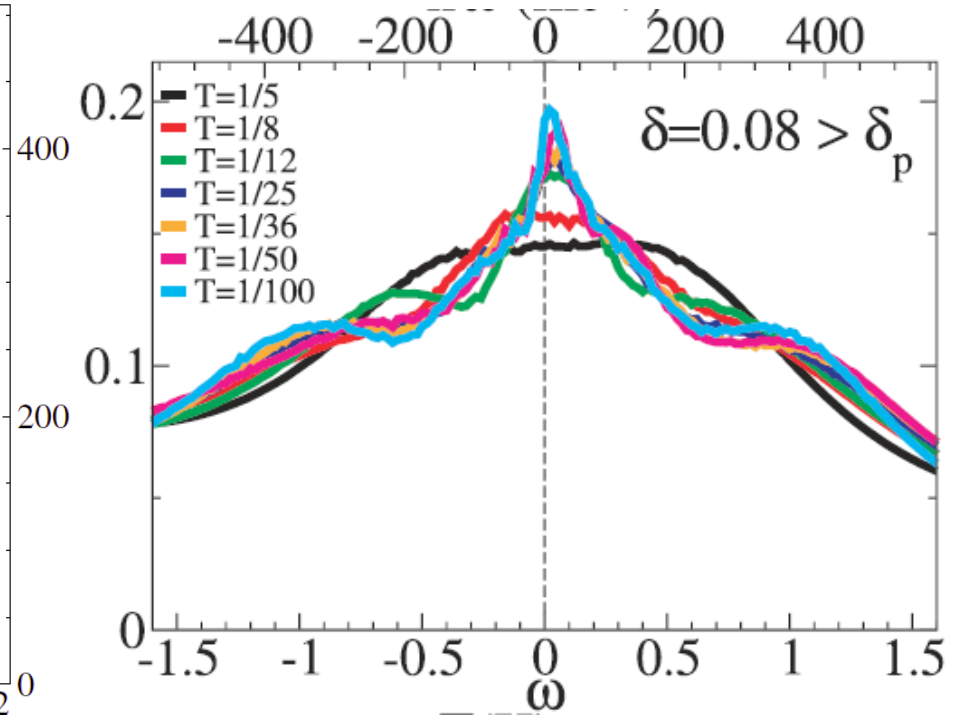
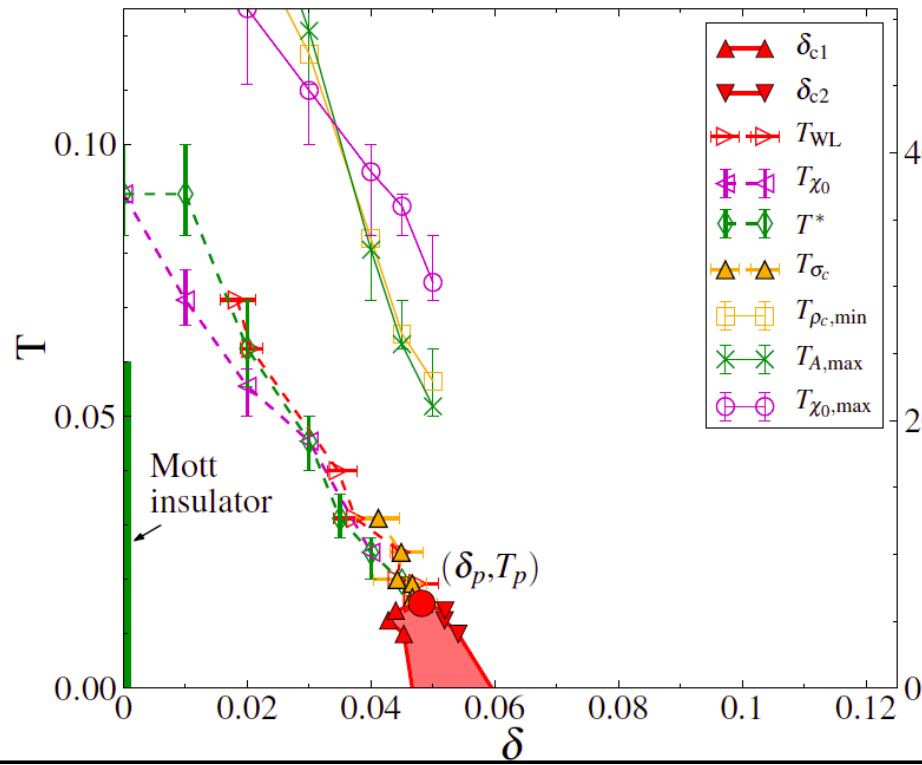


G. Sordi, *et al.* Scientific Reports 2, 547 (2012)

G. Sordi et al. Phys. Rev. Lett. 108, 216401/1-6 (2012)

P. Sémon, G. Sordi, A.-M.S.T., Phys. Rev. B **89**, 165113/1-6 (2014)

Previous results

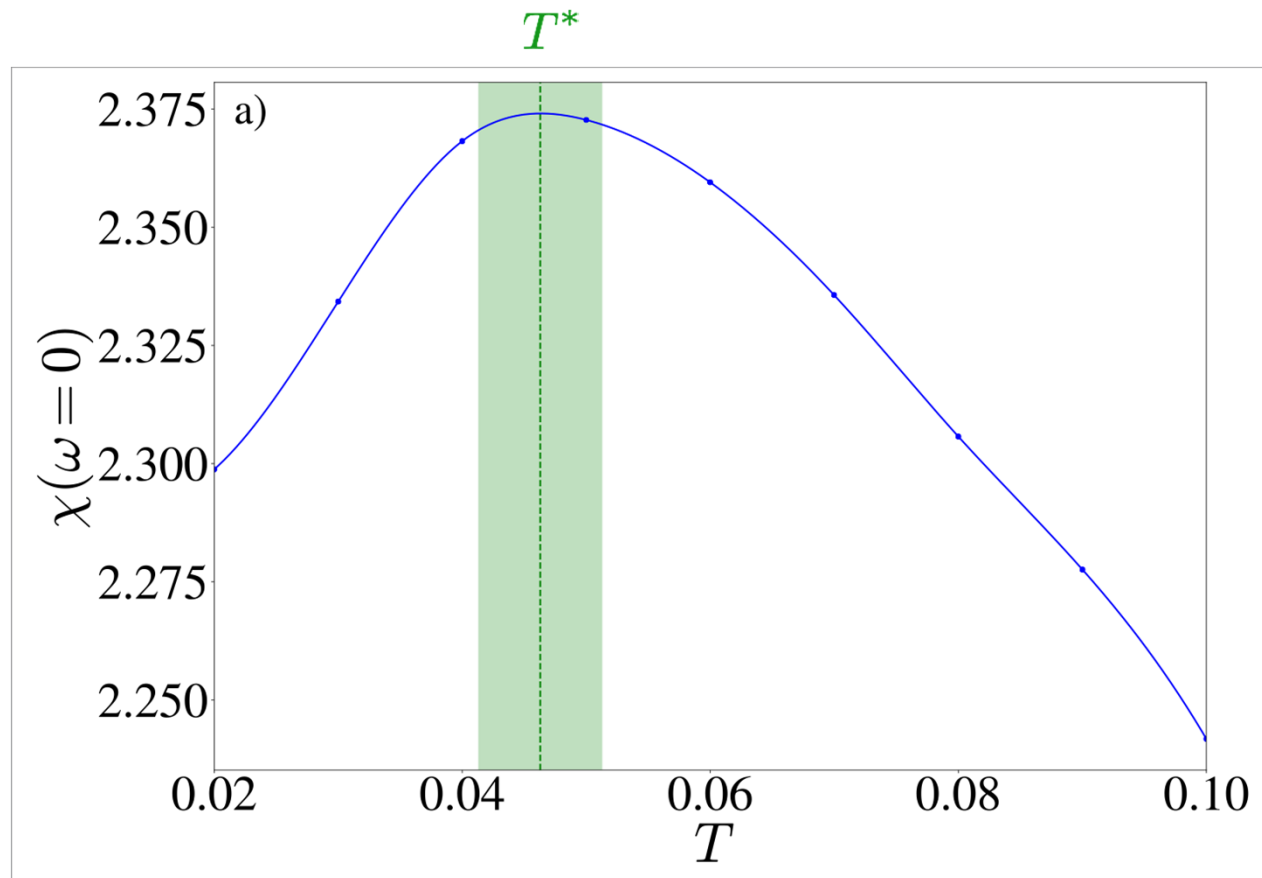


G. Sordi, *et al.* Scientific Reports 2, 547 (2012)

Results

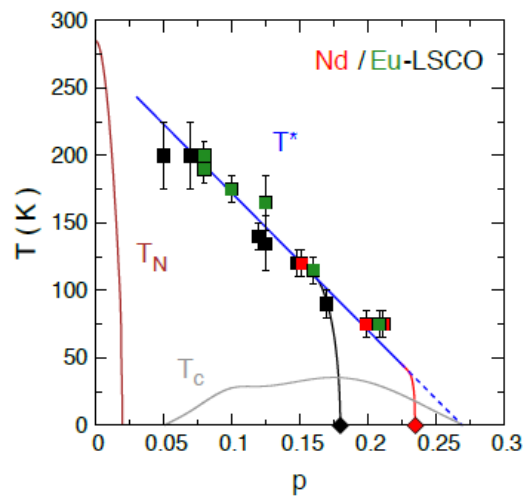
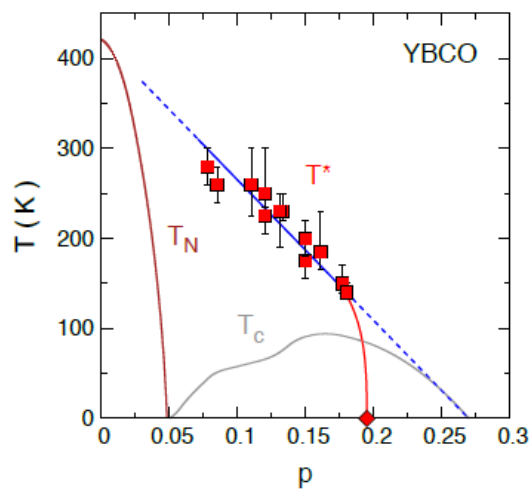
Results T^*

The criterion

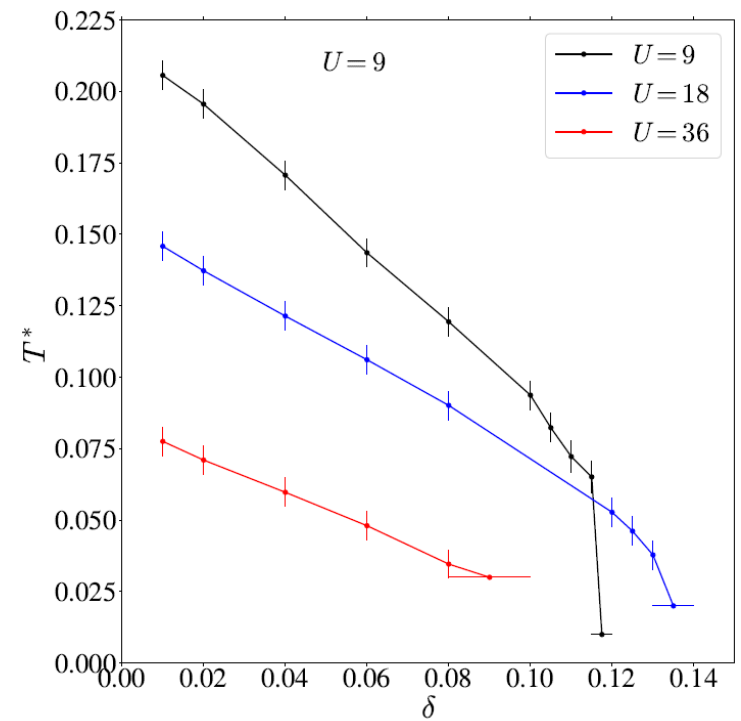


Results T^*

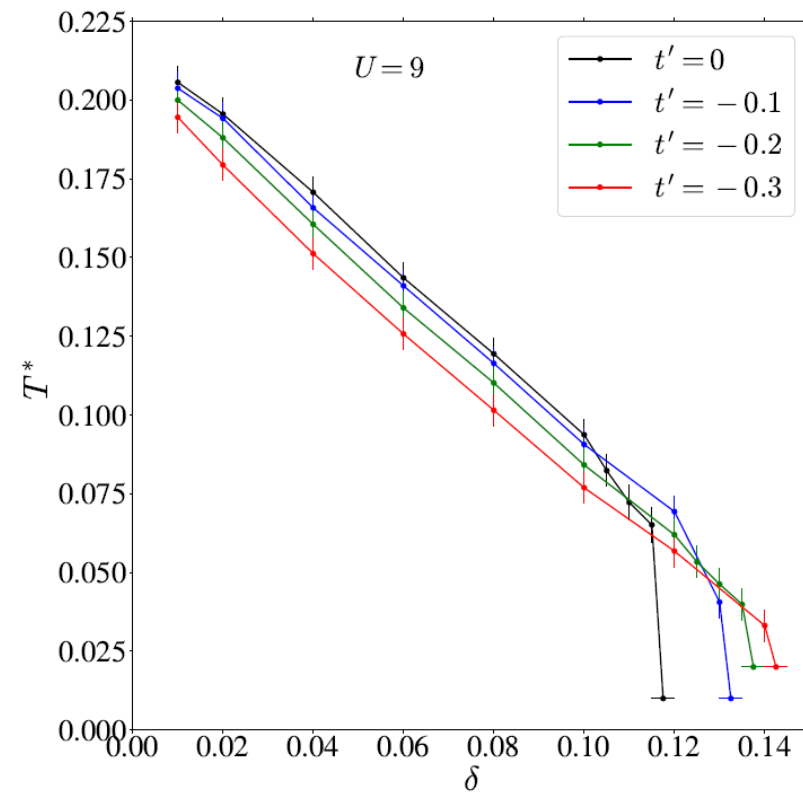
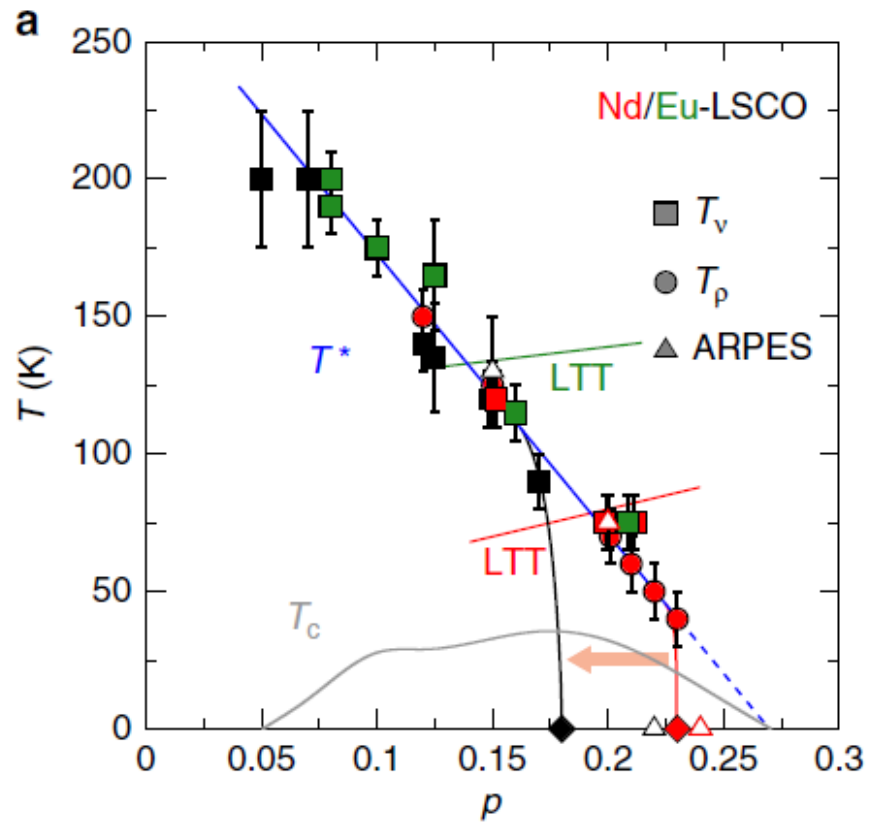
$$k_B T^* \sim J$$



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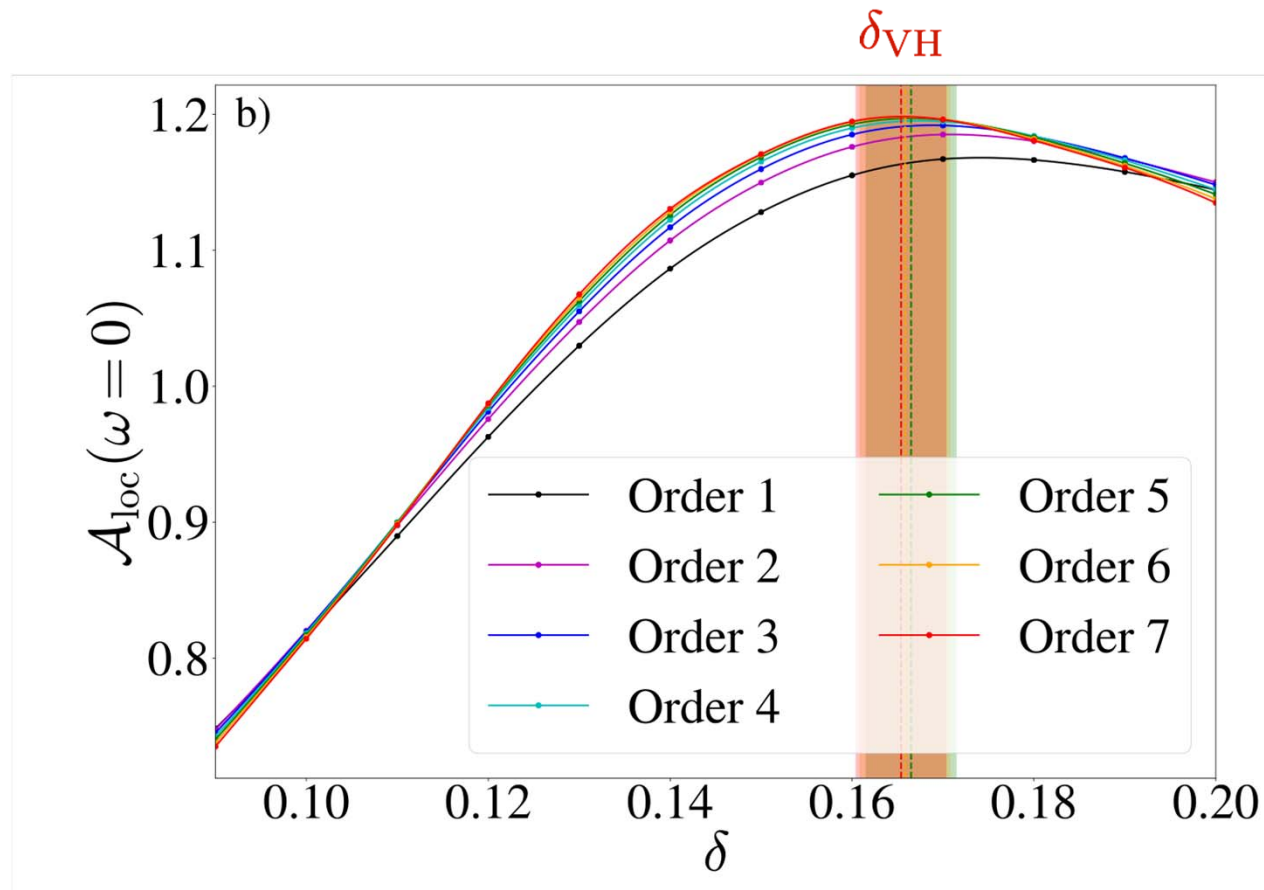


Results : effect of t' on T^*

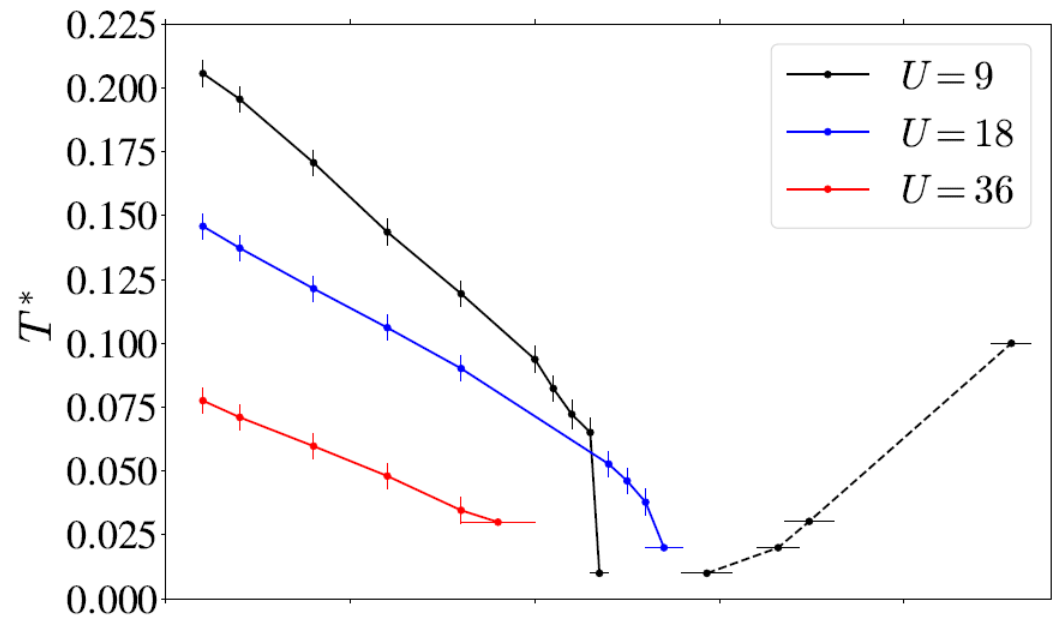
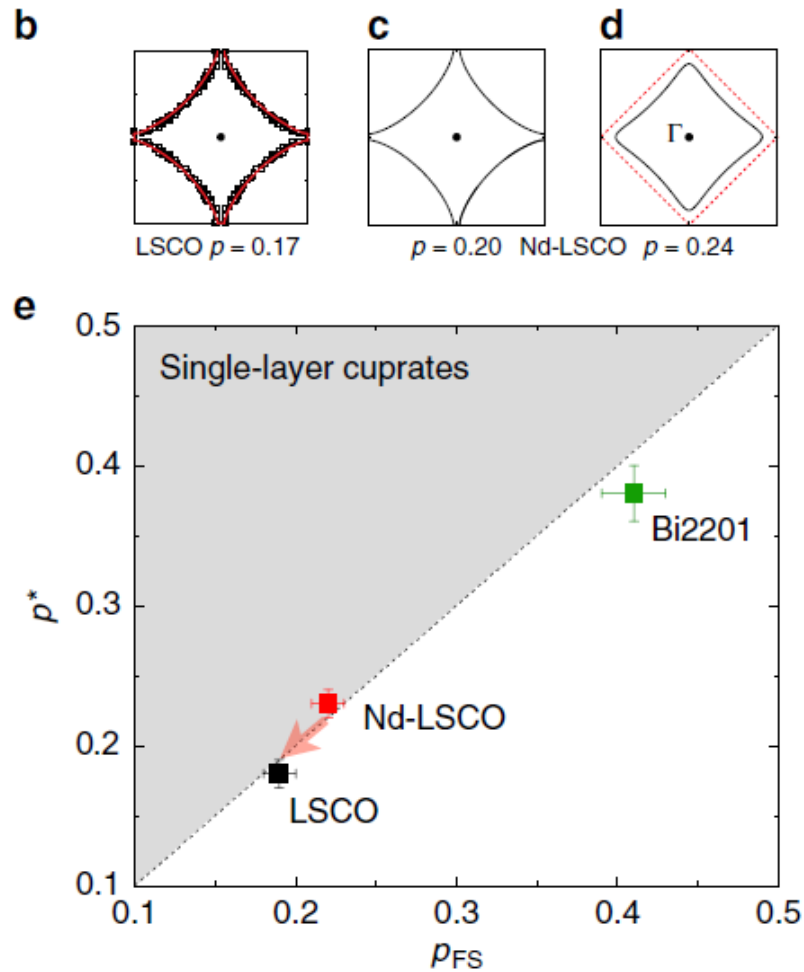


Results: Van Hove singularity

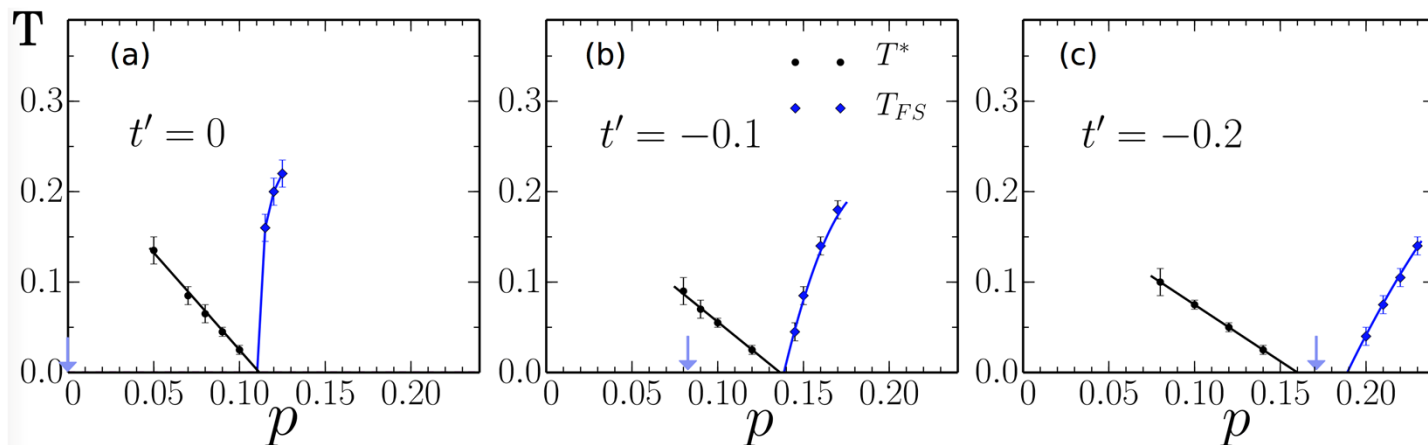
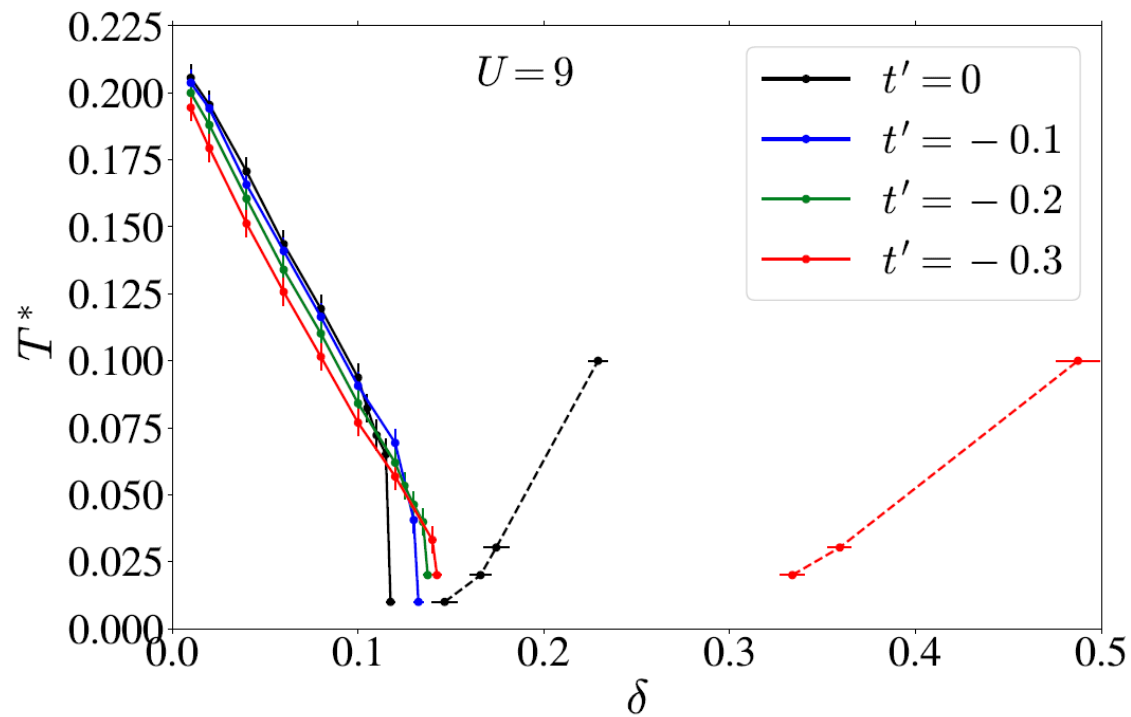
The criterion



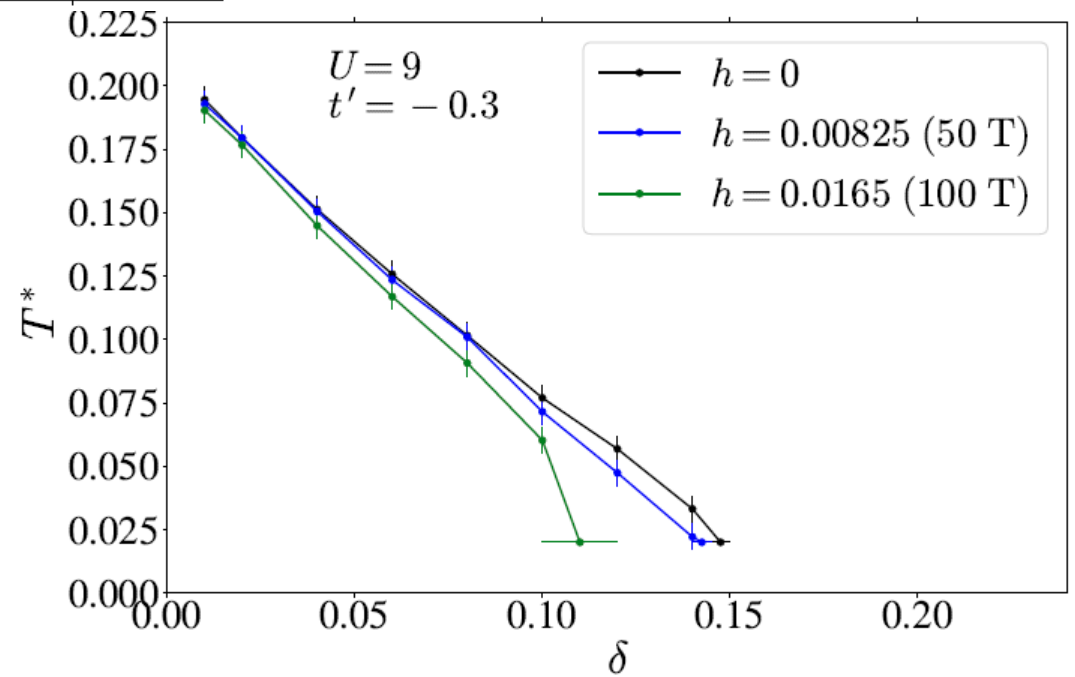
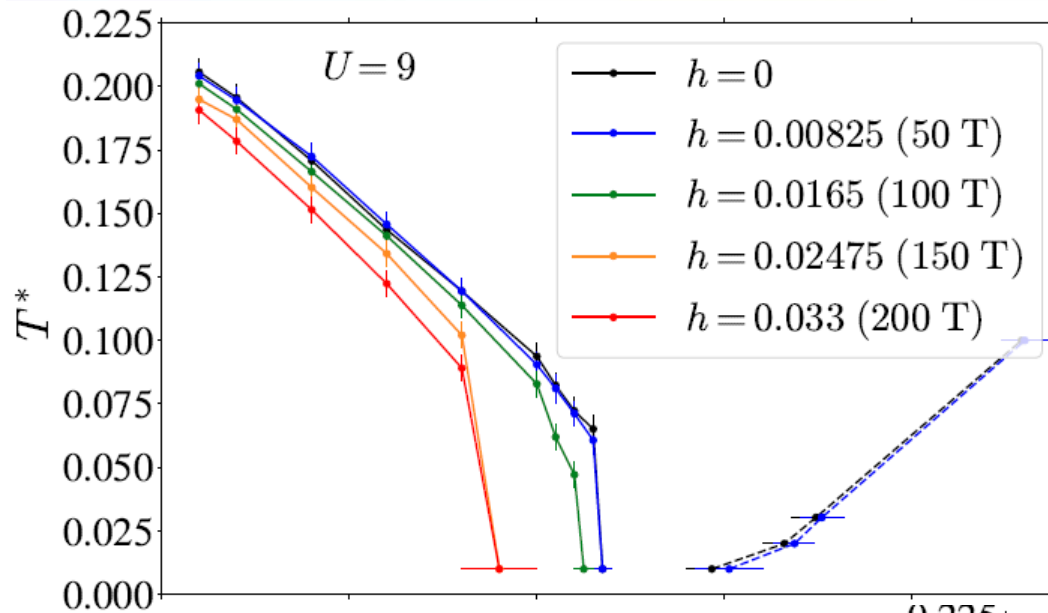
Results: van Hove singularity



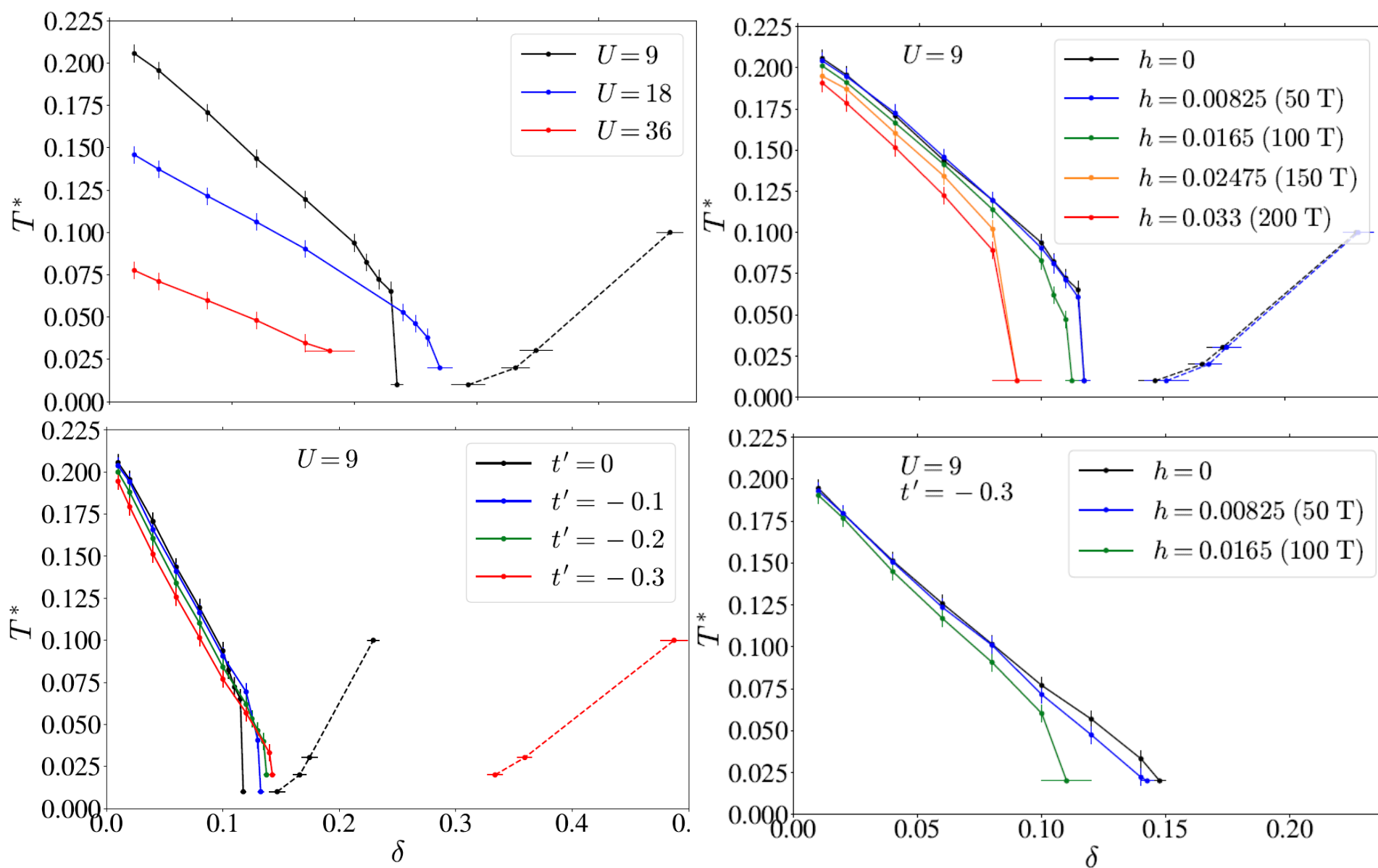
Results: van Hove singularity $\delta^* \leq \delta_{vH}$



Results : effect of Zeeman coupling



Summary



Merci



Alexis Reymbaut



Simon Bergeron



Maxime Charlebois



Patrick Sémon