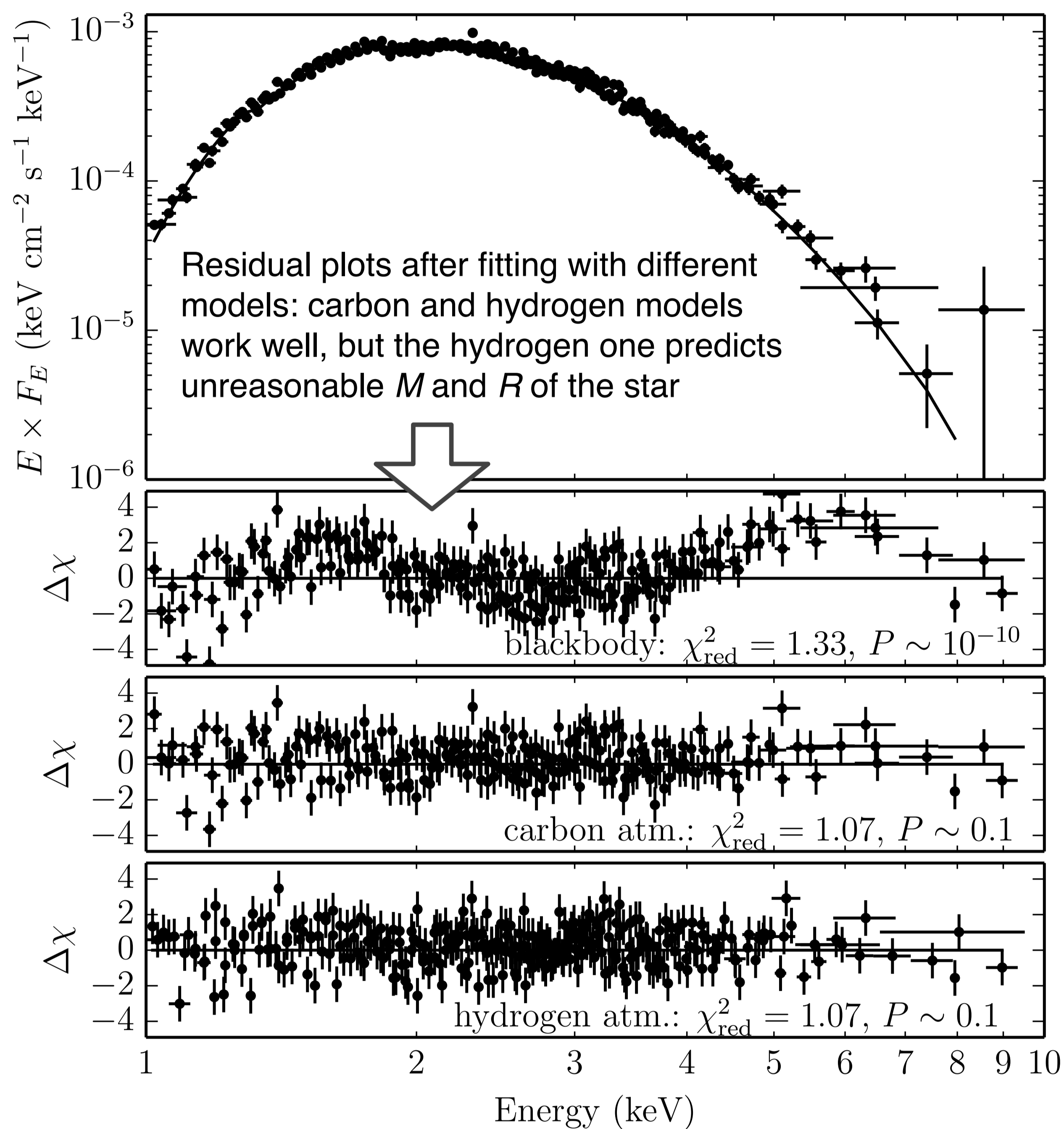


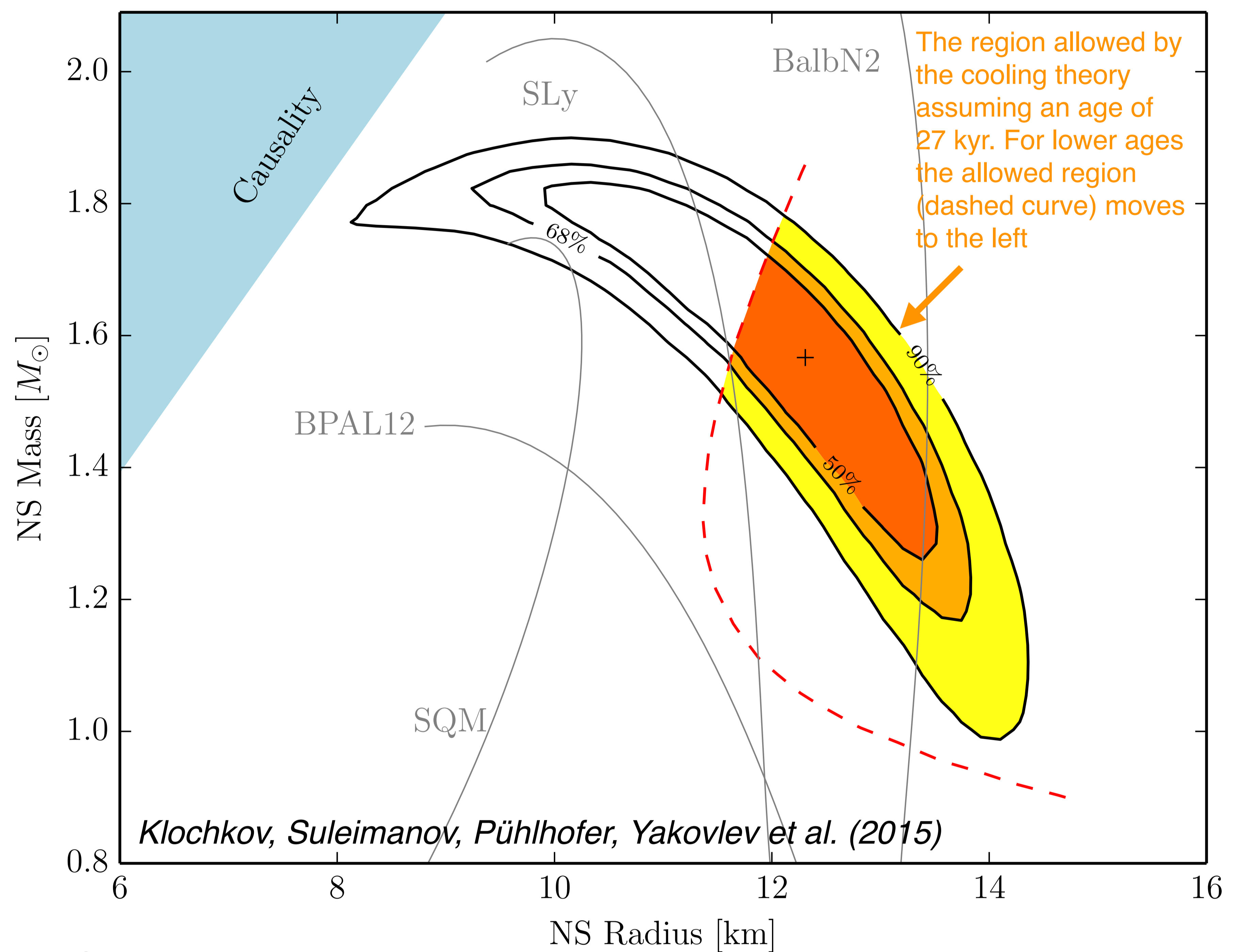
# The central compact object in HESS J1731-347 — a new laboratory to study the equation of state and cooling mechanisms of neutron stars

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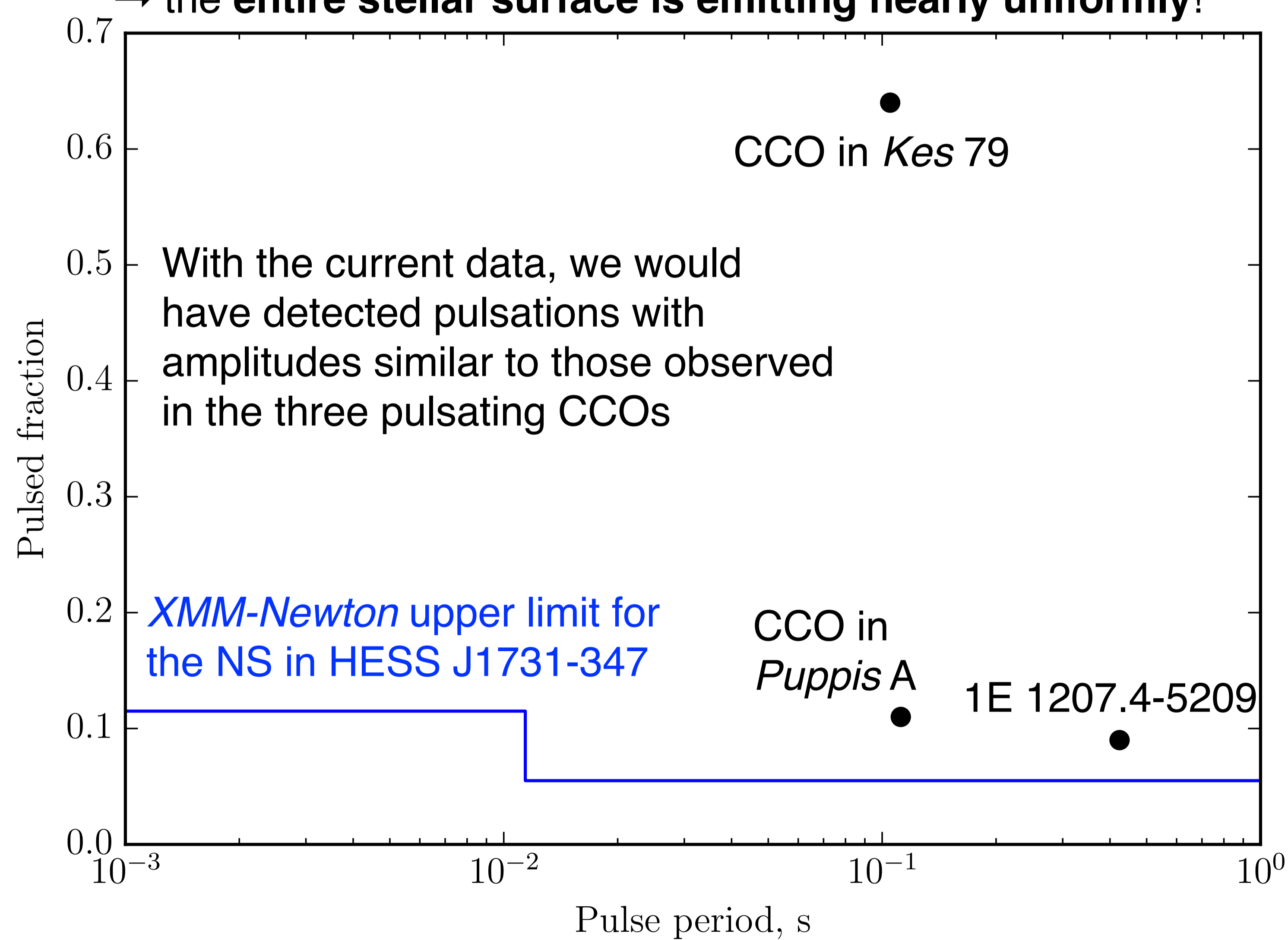
The *XMM-Newton* spectrum of the cooling neutron star in HESS J1731-374 fitted with a carbon atmosphere model



The confidence regions (solid curves) in the neutron star mass-radius plane obtained with the carbon atmosphere model and a fixed  $D=3.2$  kpc

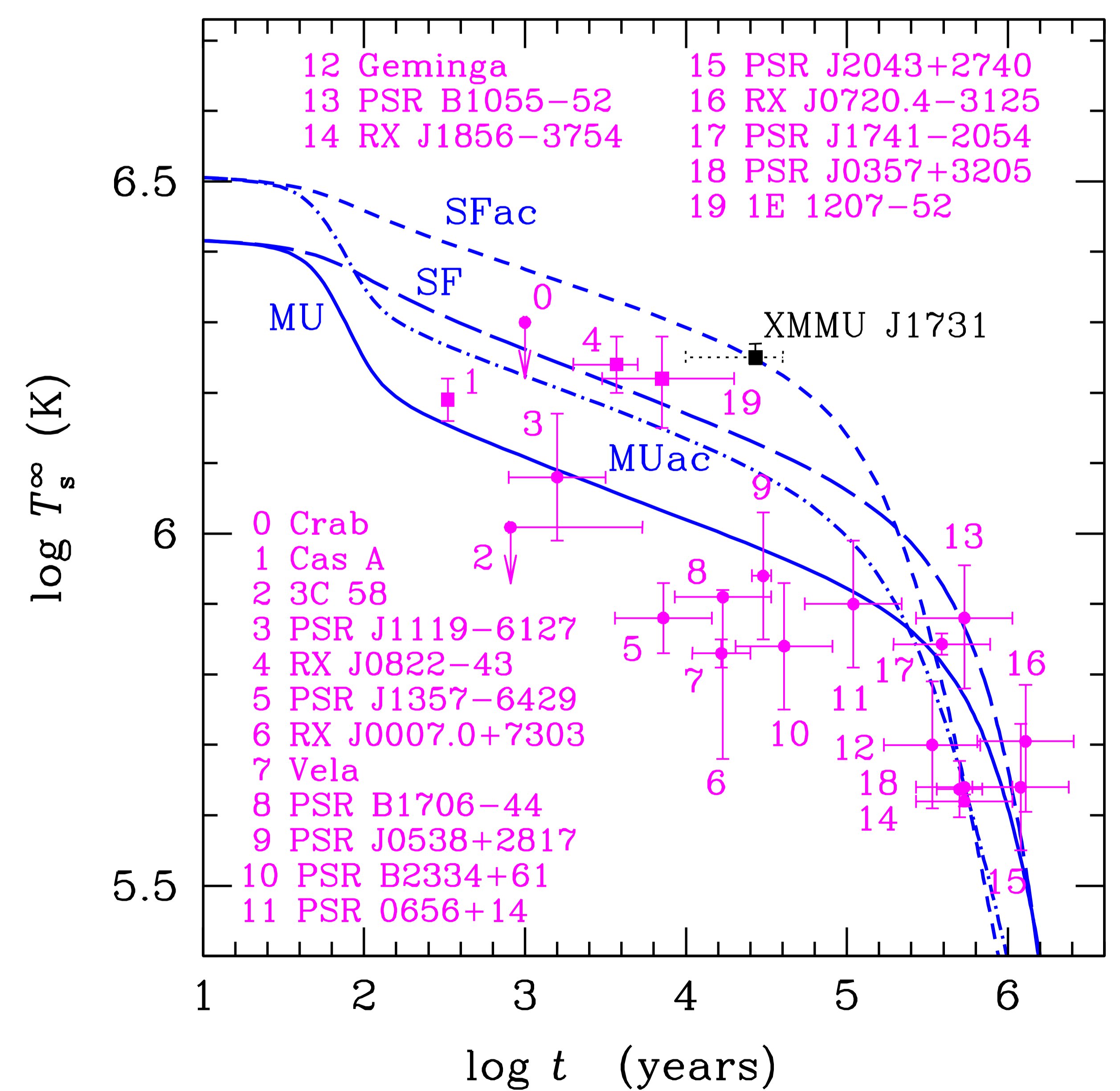


**No pulsations** are detected in the NS in HESS J1731-347 down to 5% pulsed fraction (see the upper limit in the picture below together with three CCOs where pulsations are detected) → **the entire stellar surface is emitting nearly uniformly!**



Modeling of the CCO spectrum with two hydrogen models („hot spot“ + the rest of the surface) gives an area of the hot spot(s) of **only ~2%** of the total stellar surface → **strong pulsations would be expected for such a small hot spot!**

Effective surface temperatures for a number of cooling isolated NSs including the CCO in HESS J1731-347 (*XMMU* J1731) versus their ages compared with four theoretical cooling curves for a  $1.5 M_{\odot}$  star. **The CCO appears exceptionally hot for an age above 10 kyr.**



Klochkov, Suleimanov, Pühlhofer, Yakovlev et al. (2015)