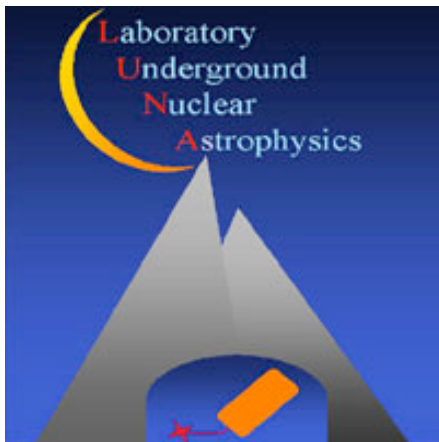


# 3-minutes countdown: Towards a study of the $^{22}\text{Ne}(p,\gamma)^{23}\text{Na}$ reaction at LUNA

Marie-Luise Menzel



**hzdr**

 **HELMHOLTZ**  
| ZENTRUM DRESDEN  
| ROSSENDORF



**TECHNISCHE  
UNIVERSITÄT  
DRESDEN**

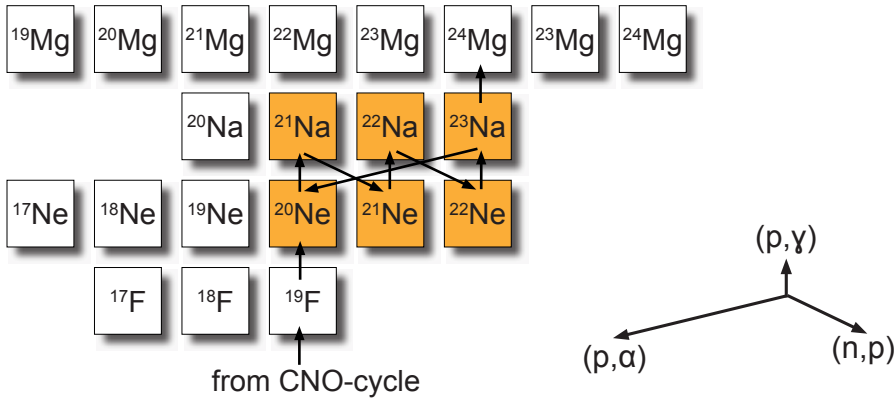


**DRESDEN  
concept**  
Exzellenz aus  
Wissenschaft  
und Kultur

1st<sup>4</sup>

**Why is  $^{22}\text{Ne}(p,\gamma)^{23}\text{Na}$  important for you?**

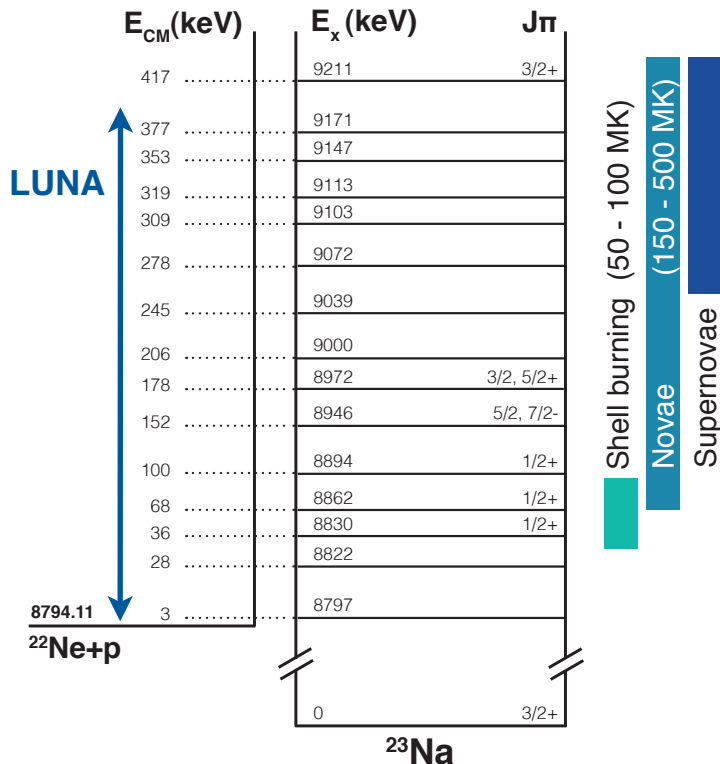
# Astrophysics



▲ Ne-Na-cycle in table of isotops



- important reaction in Ne-Na-cycle of the hydrogen burning



▲ resonance levels of  $^{23}\text{Na}$ , astrophysical relevance

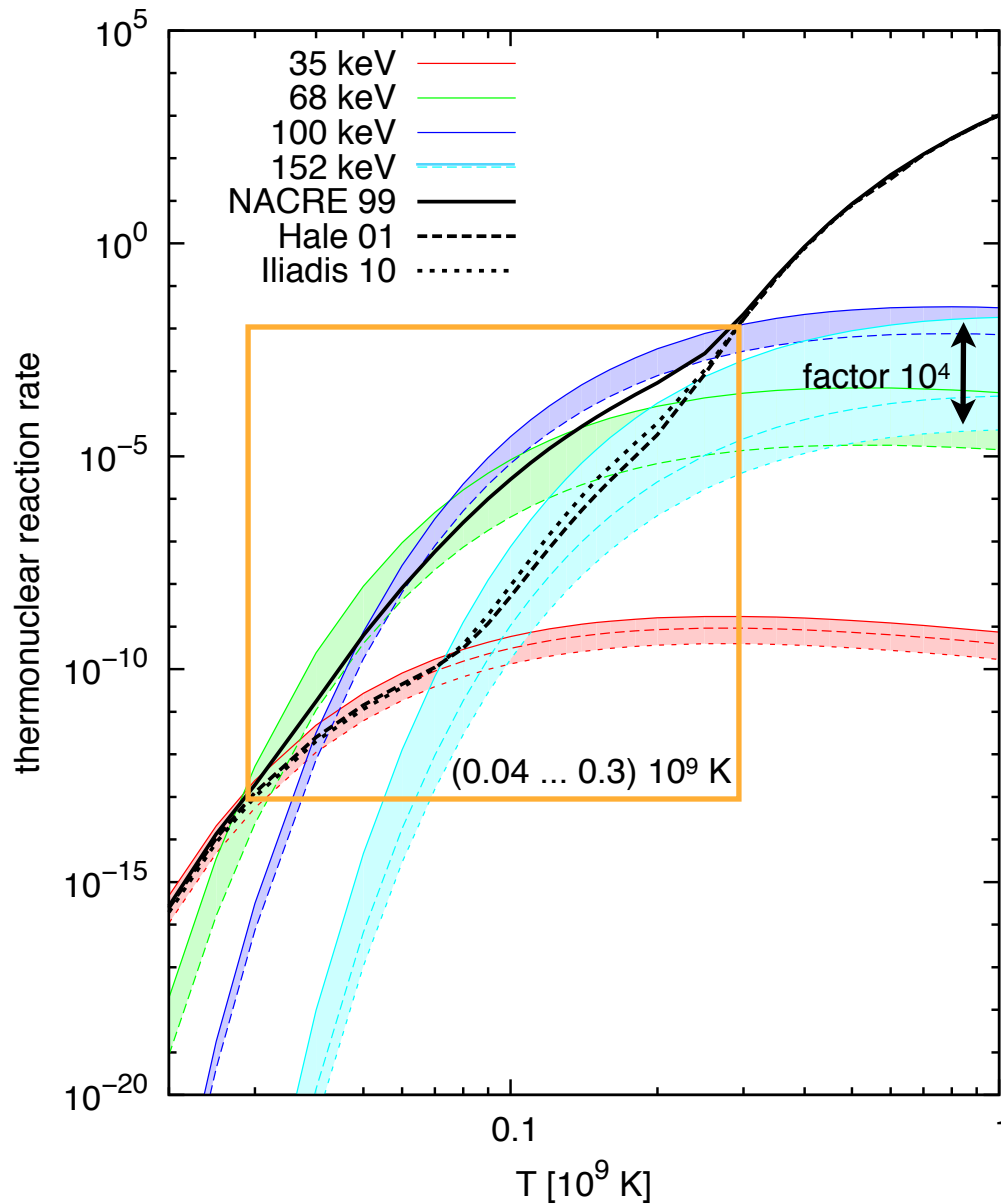
- astrophysical relevance for processes in novae, supernovae, shell burning ...

- reaction depends on strengths of several resonances

# 2nd<sup>4</sup>

**What do we know about  $^{22}\text{Ne}(p,\gamma)^{23}\text{Na}$ ?**

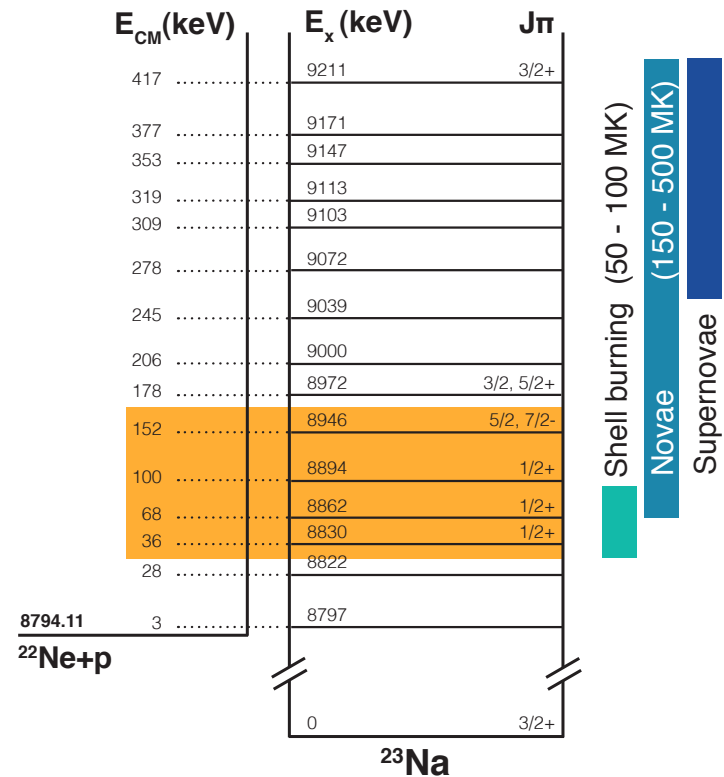
# Thermonuclear Reaction Rate



▲ thermonuclear reaction rate for Nacre 99, Hale 01, Iliadis 10

## $^{22}\text{Ne}(p,\gamma)^{23}\text{Na}$

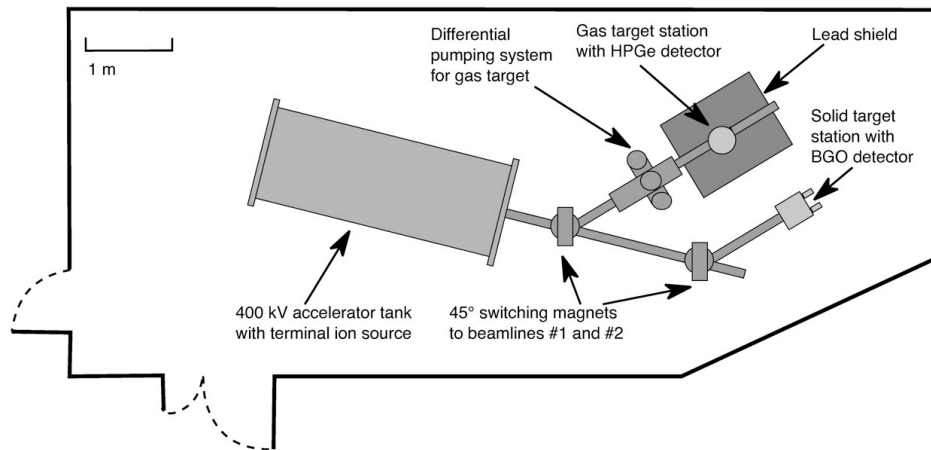
- discrepancies for resonance strengths and thermonuclear reaction rate in publications of Nacre 99, Hale 01 and Iliadis 10



# 3rd<sup>e</sup>

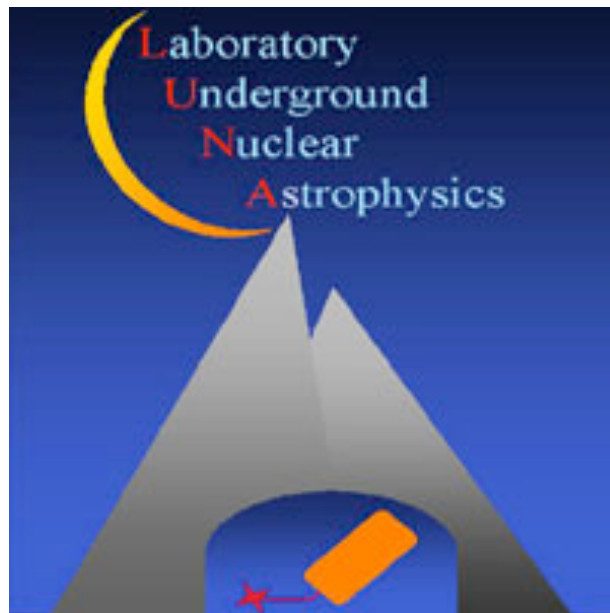
**What are we planning to do with  
 $^{22}\text{Ne}(p,\gamma)^{23}\text{Na}$ ?**

# Planned LUNA measurement



▲ the LUNA setup

- two beamline setup:  
with  $E_p = 50 \dots 400 \text{ keV}$ ,  $I_{\text{max}} = 500 \mu\text{A}$
- two neon gas targets (windowless)  
natural: 9.3%  $^{22}\text{Ne}$ , 0.3%  $^{21}\text{Ne}$ , 90.5%  $^{20}\text{Ne}$   
 $^{22}\text{Ne}$  enriched:  $^{22}\text{Ne}$  99.9%
- Phase 1: HPGe detector (high resolution)  
Phase 2: BGO detectors (high efficiency)



**There should be always time for saying**

**„Thanks“ ...**

... to the audience for listening!

... to D. Bemmerer, M. Anders, K. Schwenke, Z. Elekes  
for your great support!