**News from the Tetraneutron**

Thomas Faestermann

Technische Universität München, Germany

If a bound or resonant state of four neutrons, a tetraneutron, can be found, its energy would be a cornerstone to fix the parameters of the nuclear force. In the past six decades many experiments have been performed to detect such a system. In the first two decades of this century, two experiments [1,2] claimed the observation of a tetraneutron, though with large uncertainties in energy and width of this state. In our experiment at the tandem accelerator laboratory near Munich [3], we used the 7Li(7Li,10C)4n reaction and claimed the observation of a tetraneutron bound by 0.42(16) MeV and an upper limit for the width of 0.24 MeV. This experiment will be the main topic of the talk. Just recently, another experiment, done at RIKEN, was published [4]. It used the -knockout from 8He by protons in inverse kinematics and claims the observation of an unbound tetraneutron resonance, also with rather precise binding energy (-2.37(58) MeV) and width (1.75(37) MeV). The latter two experiments are each compatible with the former two, but not with each other. However, they might have observed different states of the tetraneutron, ours [3] the ground state and the latest one [4] the first excited state, a 2+ state formed by the two p3/2 neutrons. Most of the ample theoretical work denies the possibility of a bound state and partly even that a resonant state could exist.

[1] F.M. Marqués, et al., Phys. Rev. C 65, 044006 (2002) and F.M. Marqués, et al., arXiv:nucl-ex/0504009

[2] K. Kisamori, et al., Phys. Rev. Lett. 116, 0525091 (2016)

[3] T. Faestermann, et al., Phys. Lett. B. 824, 136799 (2022).

[4] M. Duer, et al., Nature. 606, 678 (2022).