



Contribution ID: 358

Type: **Invited Talk**

(Zoom) The Superheavy Nuclei: Fusion and Fission

Thursday, 22 August 2024 11:30 (30 minutes)

Superheavy nuclei (SHN) with extremely large amount of nucleons (e.g., protons up to $Z = 126$) are still one of the main subject in nuclear physics [1]. The main purpose of this research is to examine the fission-stability of SHN at around $Z = 114 - 126$ and $N = 184$, where occurrences of next closed shells are theoretically expected [1].

To date, SHN with Z up to 118 (Og, Oganesson) are known [2,3]. They were synthesized mostly in ^{48}Ca -induced fusion reactions with atom-at-a-time rates. A current hot topic is the synthesis of superheavy elements beyond Og, for which one has to employ fusion reactions with projectile nuclei heavier than ^{48}Ca [4].

The experimental data, e.g., partial spontaneous fission half-lives of the known SHN, confirm the concept of the island of stability. However, fission properties (fission hindrance, fragment mass distribution, etc.) are still poorly studied [5]. This situation stems mostly from a lack of comprehensive experimental data on fission.

I will discuss the above-mentioned two topics and present the related recent experimental findings at the gas-filled recoil separator TASCA, GSI (e.g., [4,6]) and the Heavy Ion Accelerator Facility of the ANU, Australia (e.g., [7]).

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[2] F.G. Kondev et al., *2021 Chinese Phys. C* 45 030001 (2021).

[3] Yu.Ts. Oganessian et al., *Phys. Rev. C* 106, 064306 (2022)

[4] J. Khuyagbaatar et al., *Phys. Rev. C* 102, 064602 (2020).

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[6] A. Di Nitto et al., *Phys. Lett. B* 994, 121662 (2019).

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Funding Agency

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Session Classification: Plenary

Track Classification: Heavy and Superheavy Elements