



**Canadian Nuclear Society**  
**Société Nucléaire Canadienne**

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**Article for CNS 2024 March Newsletter**

**A new CNS Technical Division – Space Nuclear Applications Division (CNS-SNAP-D)**

On January 26, 2024, the Canadian Nuclear Society (CNS) Council approved a proposal by Dr. Blair P. Bromley (Co-Chair of the Fusion Energy and Accelerator Science and Technology Division, CNS-FEASTD), to create a new technical division within the CNS – the Space Nuclear Applications Division (SNAP-D), also known affectionately as the *Space Nuclear Power and Propulsion for Exploration Division (SNUPPE-D, pronounced “Snoopy-D”)*.

The creation of this new technical division is considered timely, and it is expected to help provide a forum and focus for professionals and enthusiasts across Canada to better communicate and cooperate on developing the use of nuclear energy for space exploration applications.

It is anticipated that CNS-SNAP-D will be highly useful and beneficial to the CNS and to all stakeholders and individuals in Canada who have an interest in the use of nuclear energy for space exploration.

The initial co-chairs for CNS-SNAP-D will be Blair Bromley (also co-chair of CNS-FEASTD), and Dr. Justin Spencer (Canadian Nuclear Laboratories, CNL). Efforts are underway to develop the CNS-SNAP-D website, and also to recruit volunteers to serve on its Division Executive / Program Committee.

Current and renewing CNS members are encouraged to update their membership profiles, and to add CNS-SNAP-D to their list of division memberships.

**Background**

Given the increased government, public, and private sector interest and investment in space exploration initiatives, infrastructure, and technologies over the last 10 years, particularly with the Artemis Lunar Exploration program in the United States of America (USA), and other space programs within the international community (Canada, Japan, Korea, Europe, China, India, Russia, and others (see [https://en.wikipedia.org/wiki/List\\_of\\_government\\_space\\_agencies](https://en.wikipedia.org/wiki/List_of_government_space_agencies))), the time has now come where it is advantageous to establish a new technical division within the Canadian Nuclear Society – the Space Nuclear Applications Division (CNS-SNAP-D). This new division can help coordinate and facilitate education, communication, and cooperation between different stakeholder groups in Canada with regards to the use of nuclear energy for space exploration applications.

There is growing interest and recognition within Canada and within the international community of the need to develop nuclear reactor technologies that could be used to provide power and propulsion capabilities to support space exploration efforts, given the limitations of other power and propulsion options.

Reliable power and propulsion is needed for establishing and maintaining robotic and human outposts on various planetary bodies (such as the Moon, Mars, moons of Jupiter/Saturn/Uranus/Neptune), and for supporting the operation of exploratory spacecraft and probes (for all planets, moons, and asteroids within the Solar System).



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Reliable and compact power and propulsion systems are also needed for lower-cost and more rapid interplanetary space travel, and also for the potential exploration of space beyond the confines of Earth's solar system. It is recognized that for most space exploration activities beyond Low Earth Orbit (LEO), or perhaps beyond the inner part of the Solar System, the use of nuclear energy is the only viable option. The sole use of solar photovoltaic panels is impractical, given its very low energy and power density, and limited capabilities, especially during extended periods of darkness.

Within Canada, there are new initiatives at various agencies (such as the Canadian Space Agency (CSA), government-funded laboratories, universities, and private sector companies) to investigate, assess, and/or develop nuclear technology options to support space exploration efforts. Many of these efforts in Canada are in collaboration / cooperation with other nations, agencies, and programs, such as the Artemis Program in the USA with NASA (National Aeronautics and Space Administration) (see [https://en.wikipedia.org/wiki/Artemis\\_program](https://en.wikipedia.org/wiki/Artemis_program)).

### **Motivation**

There are a number of strong motivating factors for creating CNS-SNAP-D including:

- In accordance with the mission of the CNS, to help educate and inform its members, the public, government, policy makers, and various stakeholders about the science and technology of nuclear energy for different applications, including space exploration.
- To serve as an independent and objective source of information to help provide guidance and advice to government, policy makers, private industry, and the public on nuclear energy for space exploration applications.
- To help organize technical sessions and plenary sessions at the CNS Annual Conference and other stand-alone CNS seminars/webinars, workshops and topical meetings to help facilitate better communication and cooperation between different stakeholder groups in Canada that have an interest in nuclear energy for space exploration applications.
- Many individuals, but particularly students and the younger generation, who have an interest in space exploration, could be attracted and drawn to learn more about nuclear energy through the logical intersection of these two topics (nuclear energy / space exploration). Thus, there could also be an opportunity to attract more people to join as members of the Canadian Nuclear Society, through the initial, entry-level interest in the activities of CNS-SNAP-D.
- Interest in space exploration is a gateway for developing more interest in nuclear energy. There is a precedent for this initiative.
  - Within the American Nuclear Society (ANS), the Aerospace Nuclear Science and Technology Division (ANSTD) has existed for nearly 15 years (founded in 2008), and its existence has helped attract and maintain new ANS members, while providing a forum and organization for sustaining continued educational and professional development activities and topical meetings (such as the biennial topical meeting Nuclear and Emerging Technologies for Space (NETS)).



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- More information on ANSTD at: <https://anstd.ans.org/>
- More information on NETS at: <https://www.ans.org/meetings/nets2023/>
  
- The activities and “added value” by CNS-SNAP-D will augment and complement those of other CNS Technical Divisions, attracting more participants and more CNS members.

**Objectives:**

The following points highlight the key objectives for CNS-SNAP-D. These points are similar to those that have been made for the creation of other technical divisions within the CNS:

- Having a dedicated division in CNS for space nuclear power and propulsion for exploration that will focus on providing a platform for exchange of knowledge and information.
- Such a division can engage in the following activities:
  - Organize technical sessions, plenary sessions, and panel discussions for the CNS Annual Conference.
  - Organize seminars/webinars at the branch or national level.
  - Organize stand-alone workshops and topical meetings.
  - Provide information and news stories to its membership on a periodic basis.
  - Serve as an information source for identifying subject matter experts (SME) in the topics of space nuclear power and propulsion.
  - Provide advice/guidance to the individuals who want to learn more about space nuclear power and propulsion.
  - Facilitating communication and networking.
  - Maintain and populate a division website with relevant information of interest.
  - Facilitate the development of position statements and whitepapers, as appropriate.
- This division will focus on how individuals, groups and companies in the nuclear industry are turning to innovative nuclear energy technologies and methodologies to support space exploration initiatives.
- A key objective of CNS-FEASTD is to provide a forum for exchanging views, ideas and information relating to all aspects of the use of nuclear energy for space exploration applications. It is also noted and recognized that such activities could encompass the issues of radiation protection and shielding in space environment, and the development and use of advanced power and propulsion technologies (such as fusion energy, and propellant-free propulsion systems)



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**Final Statements:**

Many CNS members are excited and enthusiastic about the potential for CNS-SNAP-D.

The creation of this new technical division is timely, and it is anticipated that CNS-SNAP-D will help attract and retain many new CNS members.

CNS-SNAP-D will serve its members as an effective forum for promoting better knowledge and understanding of how nuclear energy can be applied to space exploration.

CNS-SNAP-D has the potential to facilitate better communication and cooperation by all professionals, enthusiasts and stakeholders in Canada who have an interest harnessing nuclear energy to support space exploration.