**Application for Student / Young Pugwash Conference, 27 January 2024**

**Bio:**

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**Title:**

**AI for Peaceful Use of Nuclear Energy: Future Prospects**

**A summary of your presentation, including its context:**

In the field of nuclear science, AI helps carrying out research with its techniques of experiment design, advanced data analysis, and theoretical modelling. Moreover, AI plays an important role in fusion research, an example provided by the IAEA with its five-year project aimed at expediting fusion research and development. The integration of AI into nuclear energy emerges as a key focus, with its potential to improve performance, optimize reactor design, and increase safety. AI's role in nuclear security and radiation protection is underscores its utility in processing data from radiation detection systems and safeguarding against potential cyber-attacks on nuclear facilities. The paper highlights the crucial role of AI in advancing the IAEA's safeguards, utilizing machine learning methods to improve efficiency in data analysis and verification processes. The IAEA is committed to foster collaboration on AI in nuclear applications through initiatives such as the AI for Atoms platform, collaborating with various UN organizations. Moreover, the study explores digital twins, the potential of generative AI, and machine learning applications in enhancing, efficiency, safety, and predictive maintenance in nuclear power plants. Despite the challenges including regulatory frameworks and the need for an AI-proficient workforce, the collaborative efforts of academics, non-proliferation sector, states, and civil society can pave the way for a responsible integration of AI in nuclear material production. In conclusion, the paper studies AI's transformative potential in advancing peaceful nuclear use, discussing the necessity of proactive engagement to secure the future of a safe and peaceful nuclear energy production.

**Specific policy or other recommendations, for government, international organisations or civil society, are encouraged but not essential:**

The recommendations propose strategic measures for international safety standards, workforce development, and ethical considerations to harness AI's benefits while mitigating potential risks in nuclear energy production. The IAEA and other nuclear non proliferation organisations along with committed states should introduce advanced level educational programs to cultivate an AI-proficient workforce for the nuclear industry, promoting collaboration between academia and the sector. The should also develop stringent governance mechanisms for managing and transferring sensitive nuclear-related data and control the export of critical AI infrastructure. They must encourage ethical AI practices within the nuclear industry, emphasizing transparency, accountability, and adherence to international guidelines. They should foster agreement on positive aspects and measures to reduce nuclear energy use for offensive measures Together they should work to foster international collaboration on AI for peaceful nuclear uses, promoting information exchange and sharing best practices among nations and industry stakeholders.