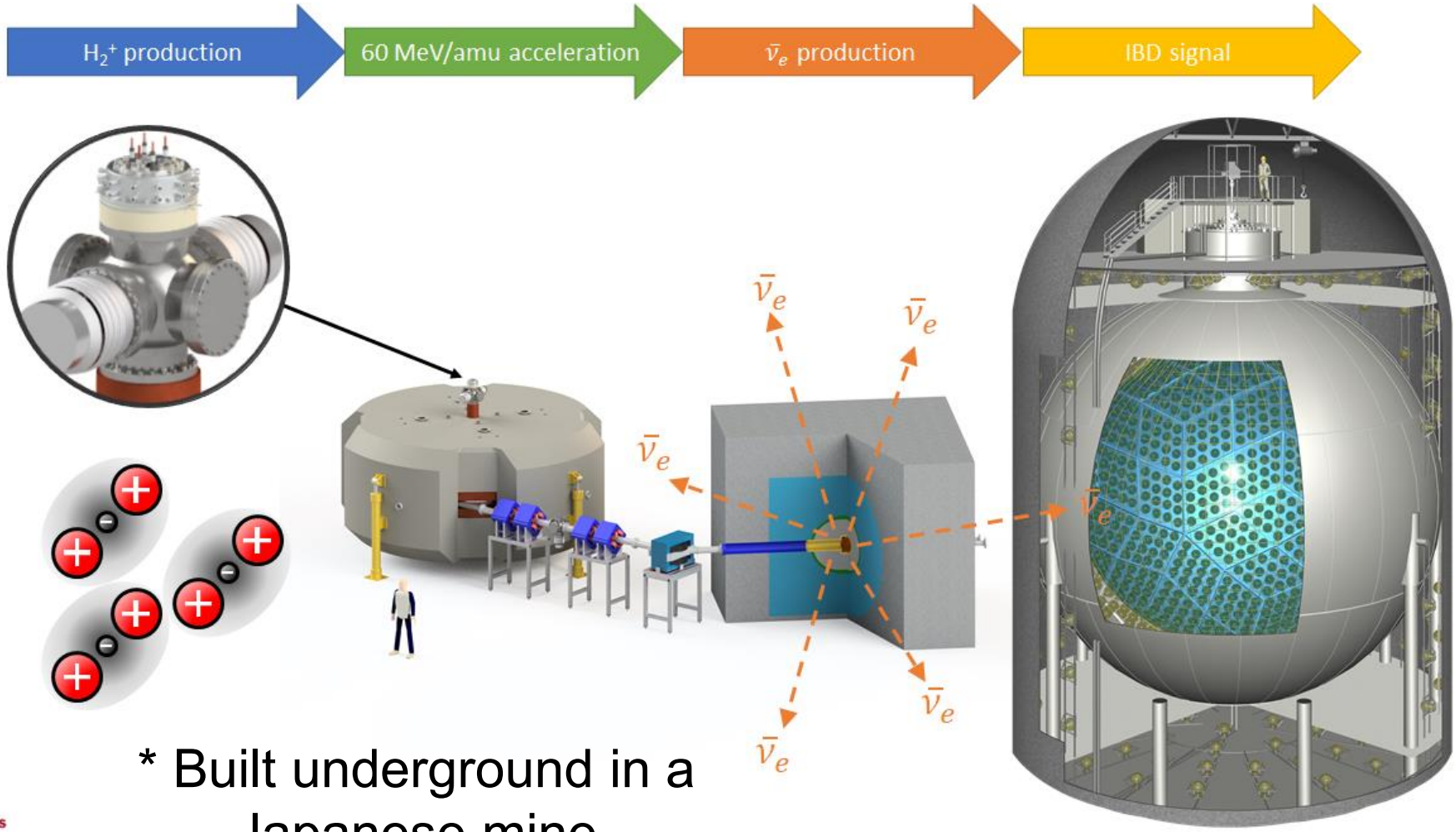
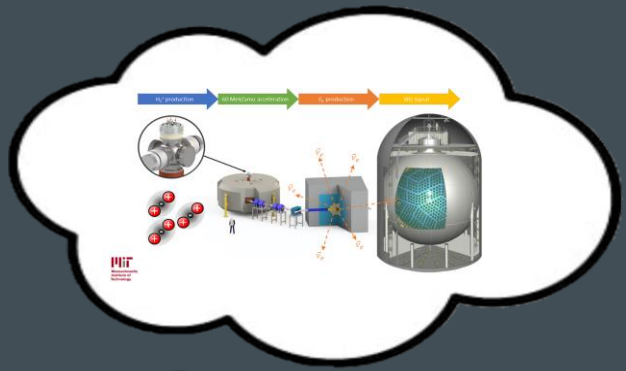
Applications of the high-Current IsoDAR Cyclotron Beyond Neutrino Physics

Loyd Waites
on Behalf of the IsoDAR Collaboration



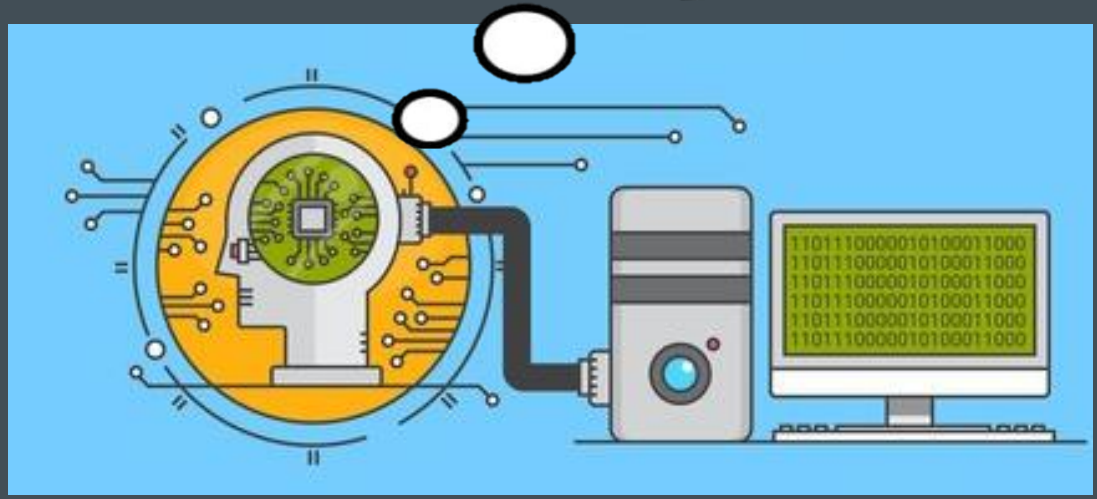
* Built underground in a Japanese mine

Massachusetts Institute of Technology



Use of Machine Learning

- Machine learning techniques to Model Accelerator System
  - Neural Networks
  - Polynomial Chaos Expansion
- Computational Speed Up
  - Sensitivity studies
  - Design Optimization



* See Poster by Daniel Koser for More information! (***Poster ID: WEPAB203)***

New Technology

- Ground-breaking current and power
- Capable of applications beyond the scope of particle physics

Parameter	IsoDAR	IBA C-30	IBA C-70
Maximum energy (MeV/amu)	60	30	70
Beam current (milliamps)	10	1.2	0.75
Pole radius (meters)	1.99	0.91	1.24
Outer diameter (meters)	6.2	3	4
Iron weight (tons)	450	50	140
Elect. Power reqd. (megawatts)	3.5	0.15	0.5

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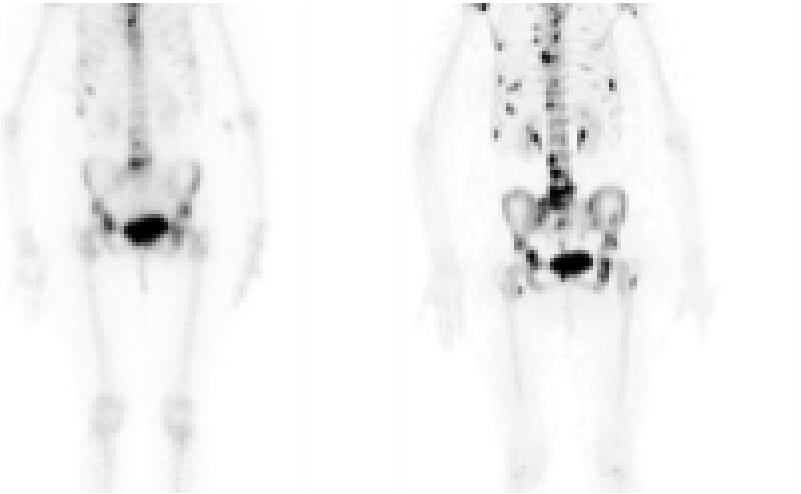
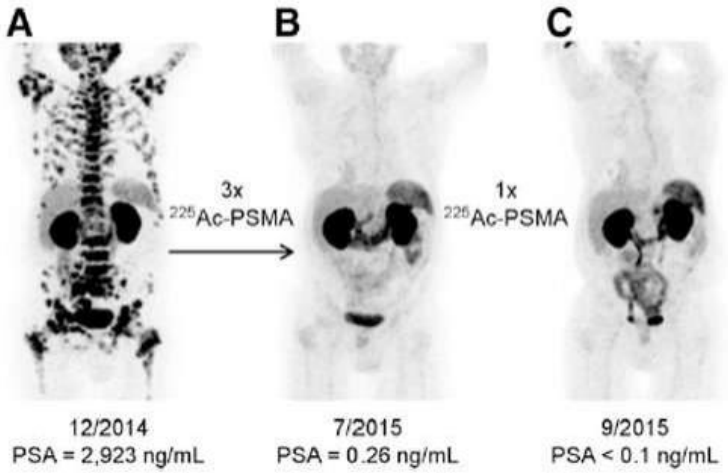


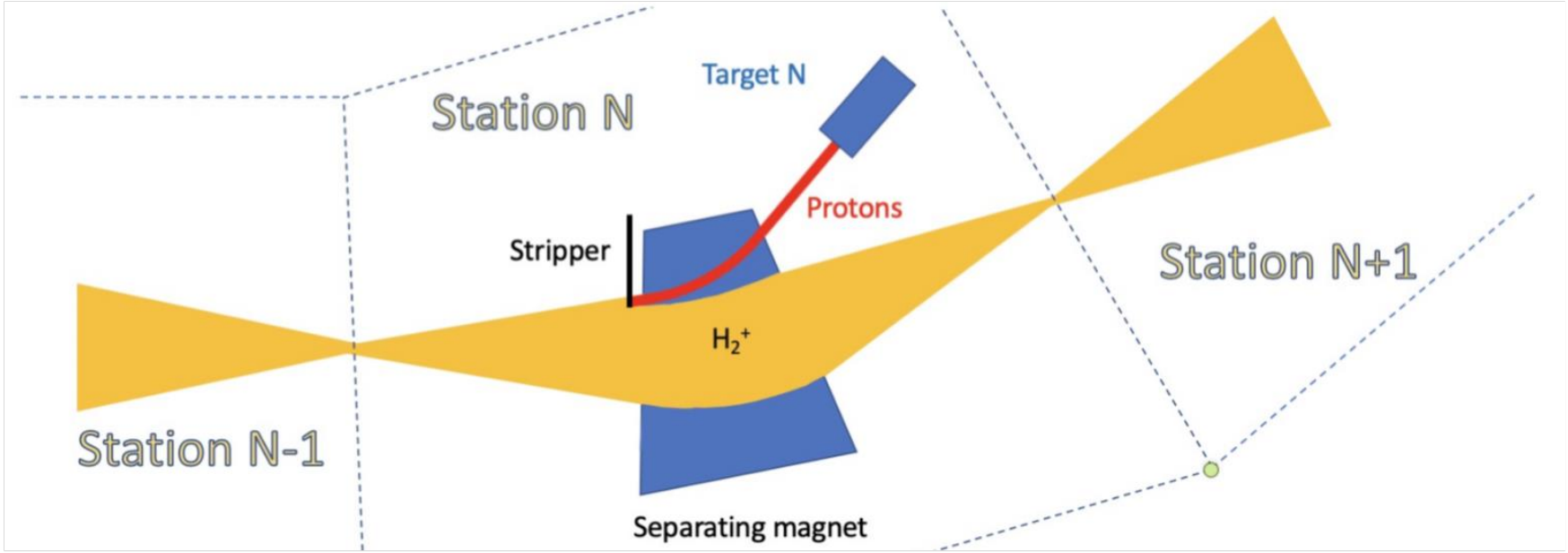


Medical Isotope production

- Exciting medical applications limited by production
  - Prohibitive Cost/ Rare isotopes
  - Target Power

Target Management

- Use of electron strippers to divide beam
- Can be done repeatedly
- Enables target testbed / R&D



Conclusions

The requirements of an ambitious particle physics experiment have driven the development of new cyclotron technology. This development can grow beyond the scope of neutrino physics, and shift paradigms in the medical isotope community.

IsoDAR not only has the opportunity to change physics, but also has the opportunity to change lives.