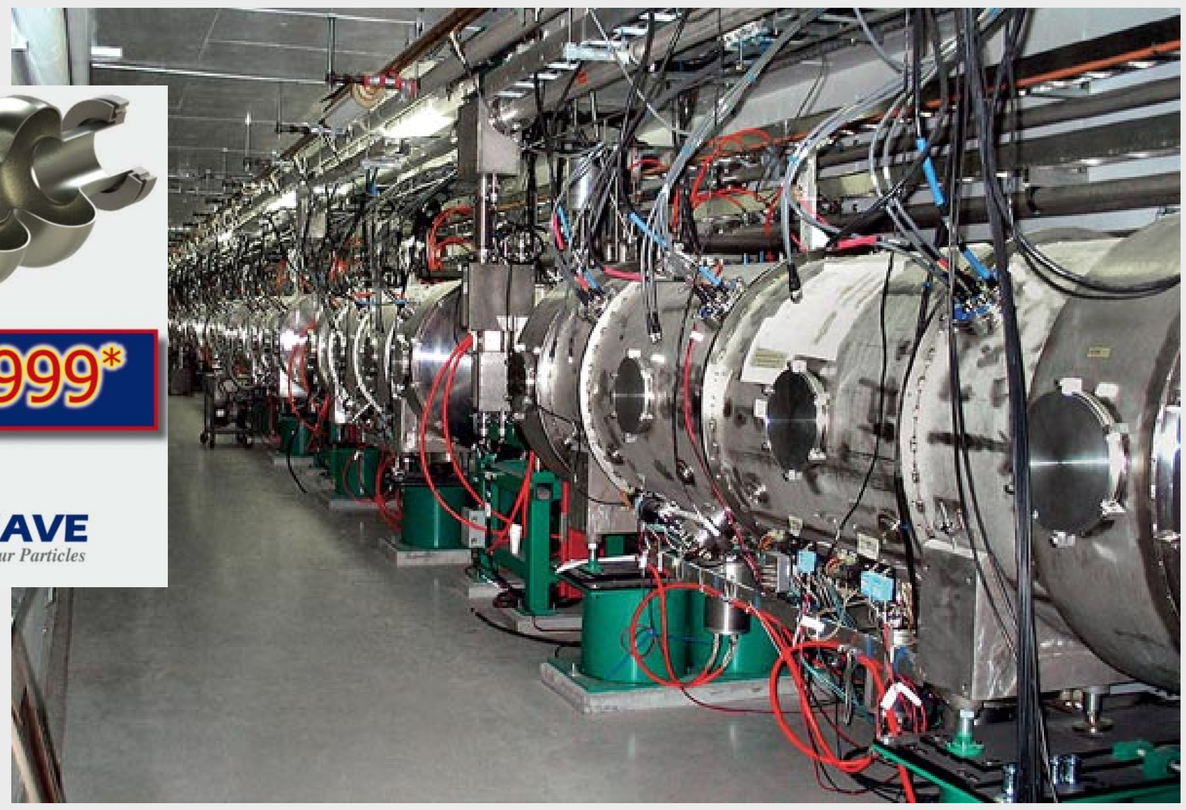
Mu*STAR, Inc. – Value Proposition –
High-Power Superconducting Linacs Driving Subcritical GEM*STAR Small Modular Systems

Our product solves customer problems and improves their situation,

Our commercial superconducting particle accelerators provide unlimited power by safely burning accumulated spent fuel from nuclear reactors and warheads of nuclear weapons.



Accelerator and components produced by Consortiun members

We deliver specific benefits

Technology recently demonstrated at Oak Ridge National Laboratory divorces our GEM*STAR commercial power generation method from over 6 decades of reliance on enrichment and reprocessing, which were invented to make weapons.

Large numbers of neutrons produced by the accelerator interact with the molten salt fuel, made from Spent Nuclear Fuel (SNF) or Weapons-grade Plutonium (WGPu), to produce heat for electricity or industrial uses while reducing the quantity and toxicity of the fuel.

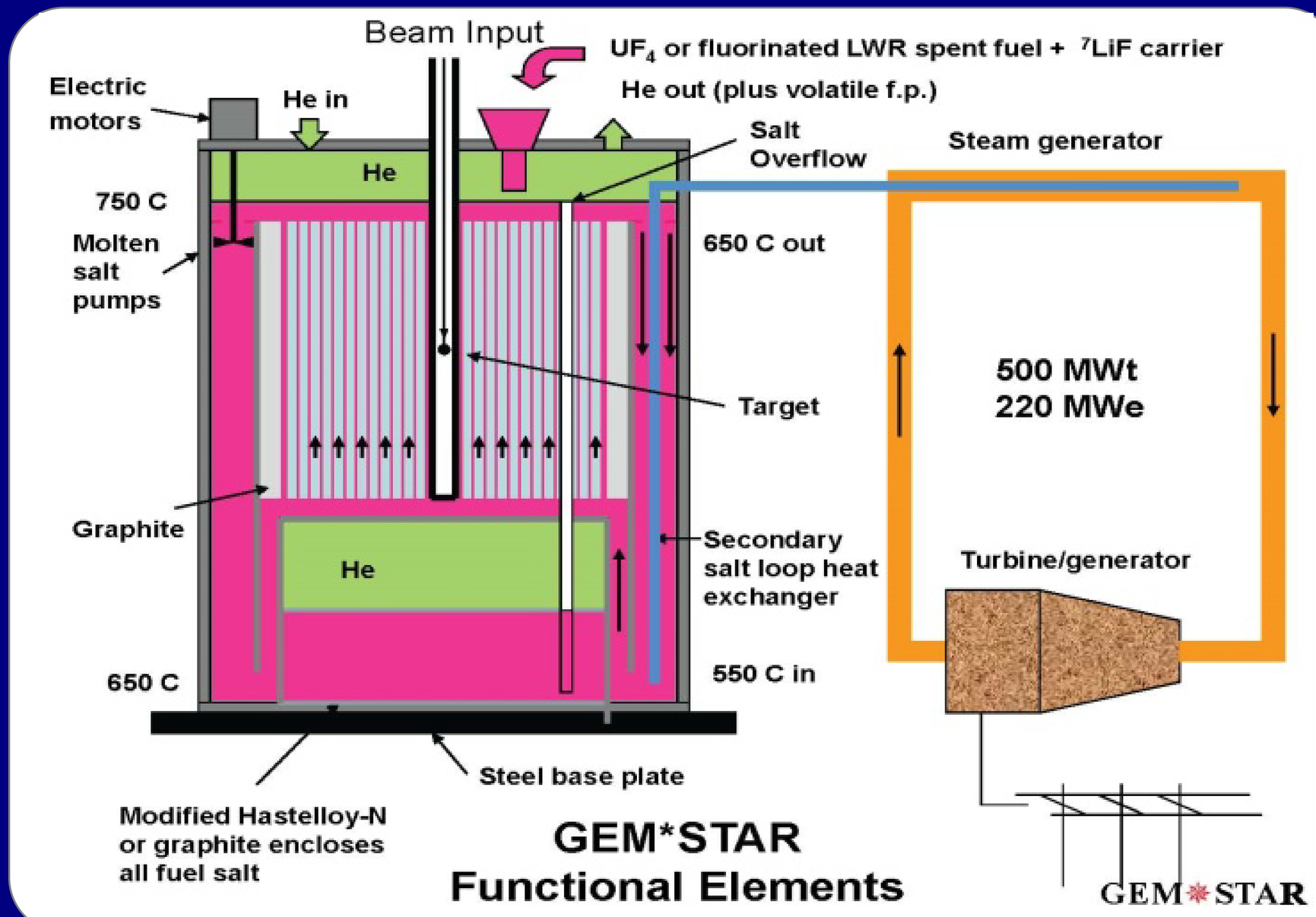
Our systems operate below criticality, can be stopped by switching off the accelerator, require no control rods, pressure vessel, or containment vessel, and will be attractive even to most nuclear energy skeptics because of intrinsic safety, environmental, and weapons proliferation advantages.

Mu*STAR systems are cost effective due to accelerator modularity and the simplicity of GEM*STAR units. They will be fastest to license because of their subcriticality.

Why people should invest in us

Mu*STAR Inc., promoting high-power superconducting accelerators driving subcritical GEM*STAR small modular systems, has been created to support a consortium of private companies, universities, and national laboratories to design, build, and exploit this new approach to nuclear energy. This team is uniquely ready to carry out these tasks by virtue of their complementary skills, experience, assets, and leadership. Contact rol@muonsinc.com

Mu*STAR, Inc. - A New Company to Promote High-Power Superconducting Linacs Driving Subcritical GEM*STAR Small Modular Systems



The Mu*STAR Consortium

- ADNA Corp
- George Washington Univ.
- Jefferson Lab
- Muons, Inc.
- Newport News Shipbuilding
- Niowave, Inc.
- Oak Ridge NL
- Viginia Tech

Proposed to the DOE to design and build a pilot plant to dispose of 34 T of WGPu.

The Pilot Plant will burn SNF, Pu and U weapons materials, natural U or natural Th, without redesign

And can be augmented to burn the 34 T in 30 years to provide 42B gallons of green diesel fuel for the DOD by converting natural gas and renewable carbon using the Fischer-Tropsch process.

Safety

- Never requires a critical mass
  - Fission is stopped by turning off the accelerator
  - Mechanical control rods are not needed
  - Understanding subcriticality increases nuclear power acceptance
- No stored large volatile fission product inventory inside the reactor
  - Volatile FPs continuously removed and stored underground
  - Radioactive volatile FP inventory inside the reactor is reduced by almost a factor of a million compared to LWRs

  Reduces Defense in Depth problem
- Passive recovery from a loss of power or loss of coolant accident
  - Accelerator shuts down to stop fission
  - Simple modular reactor design limited to 500 MWt
  - Convective air cooling of heat from radioactive decay
- Internal heat exchange from molten salt fuel to molten salt coolant
  - Non-volatile FPs remain inside the reactor core or lower reservoir
- Freeze plug drains fuel into lower reservoir if temperature too high
  - In case of operator errors
  - Nothing is destroyed in this mitigation technique
  - Operation is resumed by refilling from the lower chamber
- Operation at atmospheric pressure – no pressure vessel
- Neither fuel enrichment nor chemical reprocessing is required
- Operation above the annealing temperature of graphite
- Accelerator and reactors are below ground level

Operations

- Liquid fuel moved by He pressure; no radiation exposure to humans
  - allows graphite and spallation target replacement
- Operates at atmospheric pressure - No pressure vessel
- Low vapor pressure molten salt
- No chemical reprocessing required - No fuel enrichment required
- Feed/bleed concept allows for continuous operation
  - No need to replace or move fuel pins

Economics

- Fuel in the form of molten fluoride salts eliminates fabrication, installation, replacement and
  - waste management needed for fuel rods
- Complexity of the reactor is reduced by adding a complex, but well tested, accelerator
  - Superconducting RF accelerators are on a steep development curve, and will only get simpler, shorter, more powerful, more efficient, and less expensive with time
- One accelerator can feed several GEM*STAR reactors, each with its independent proton source
  - Accelerator is itself modular and can be repaired quickly and safely
  - Operation history at SNS and CEBAF shows acceptable reliability
  - Capital costs for a multi-MW proton accelerator reduced drastically in last 20 years.
  - Wall power (MWw) to beam power (MWb) efficiency with Superconducting RF (SRF) is much improved relative to previous copper structures – will be >50%.
  - 25 MWb, 1 GeV accelerator designed at ANL with DOE costed at ~$800M – can feed up to 10 GEM*STAR SMRs

Pilot Plant to Dispose of WGPu

- Economy of GEM*STAR WGPu disposition is compelling
- Burned WGPu never useful for weapons
- Burned WGPu never decays back to weapons useful material
- Conversion to non-WGPu immediately upon entry into the reactor
- Pu isotopic mixture can be reduced from 34 tons to 0.2 tons if desired
- Also converts Commercial Pu (C-Pu) to-non-weapons-useful material
- Fission energy converted to diesel and sold as green fuel to DOD
  - for profit compared to MOX plan which has >$30B expense
- No conversion to MOX; conversion of Pu metal or PuO_2 to PuF_3