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Title: Minimum Critical Mass of Heterogeneous Moderated Pu Metal Systems

Author(s): Wysong, Andrew Russell
Glazener, Natasha
Salazar-Crockett, Alicia
Krentz-Wee, Rebecca Elizabeth

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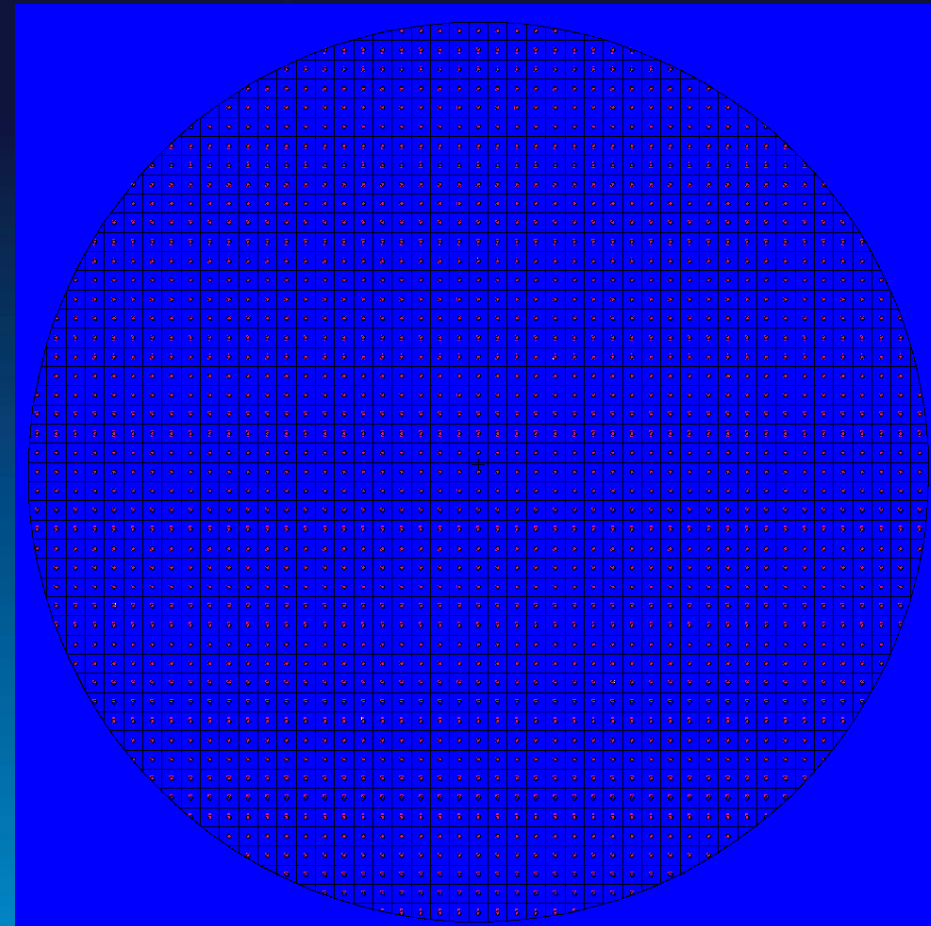
Minimum Critical Mass of Heterogeneous Moderated Pu Metal Systems

6-9-2015

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Systems Modeled

- 100% ^{239}Pu
- 19.86 g/cc
- Pu in spheres, cubes or rods
- Square pitch lattice
- Water fill (1g/cc)
- Infinite water reflector
- Compared using SA / Vol



Spheres, radius=0.1 cm

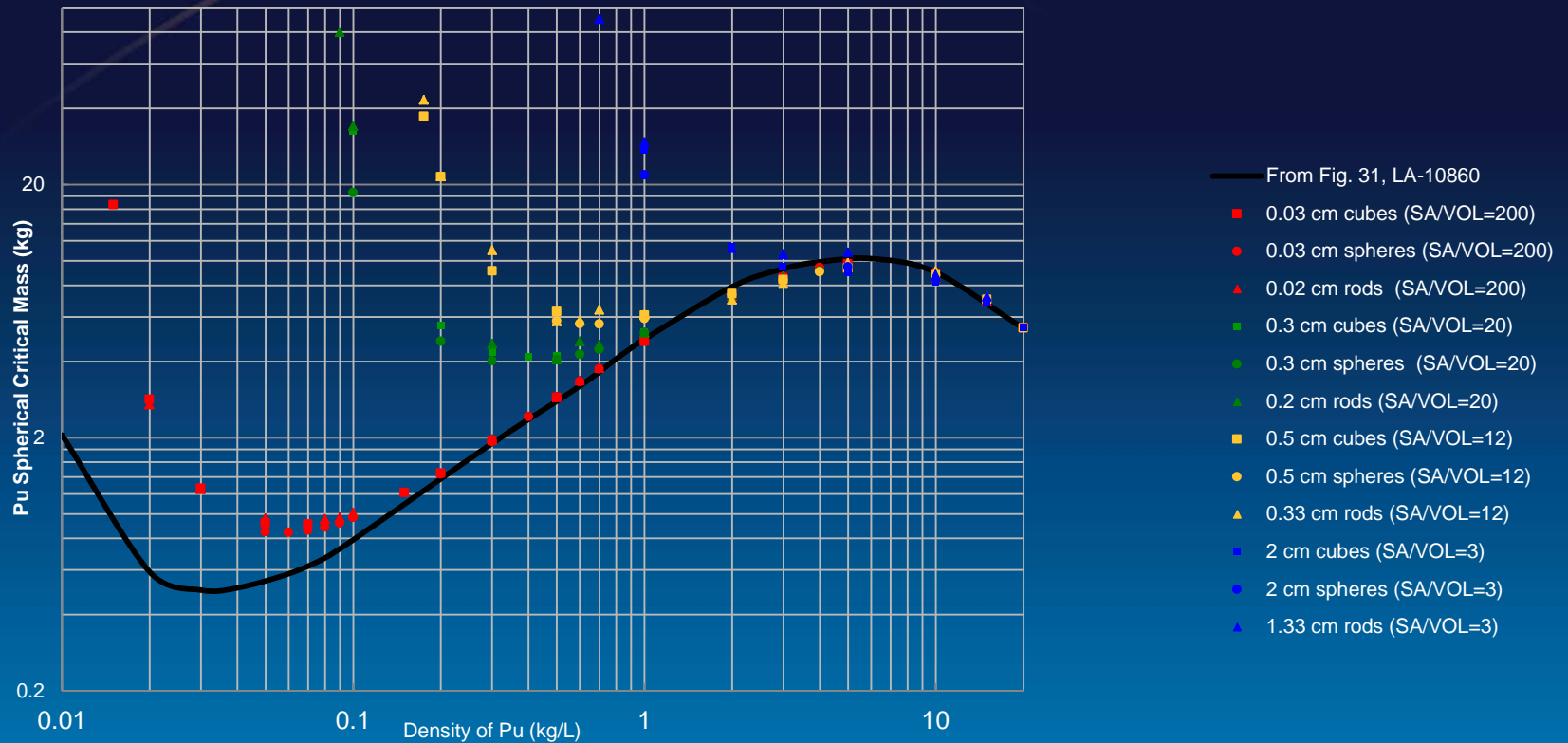
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Modeling details

- MCNP 6.1
- ENDF/B-VII.1
- At least 1 million particle
- Used lwtr.20t
- No bias was assumed (ie critical is $k_{\text{calc}}=1$)

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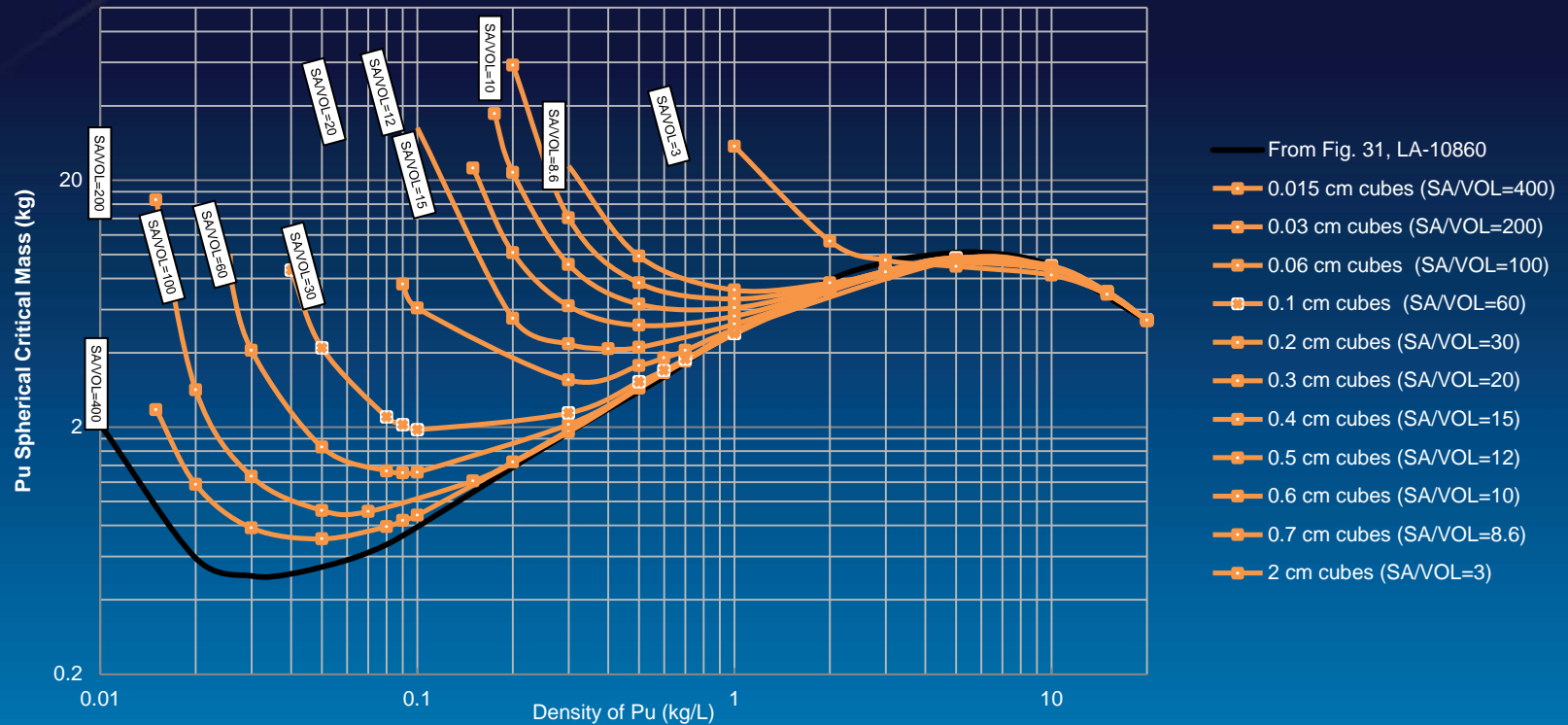
Comparison Across Geometry



Results Compared with Data from Figure 31 of LA-10860

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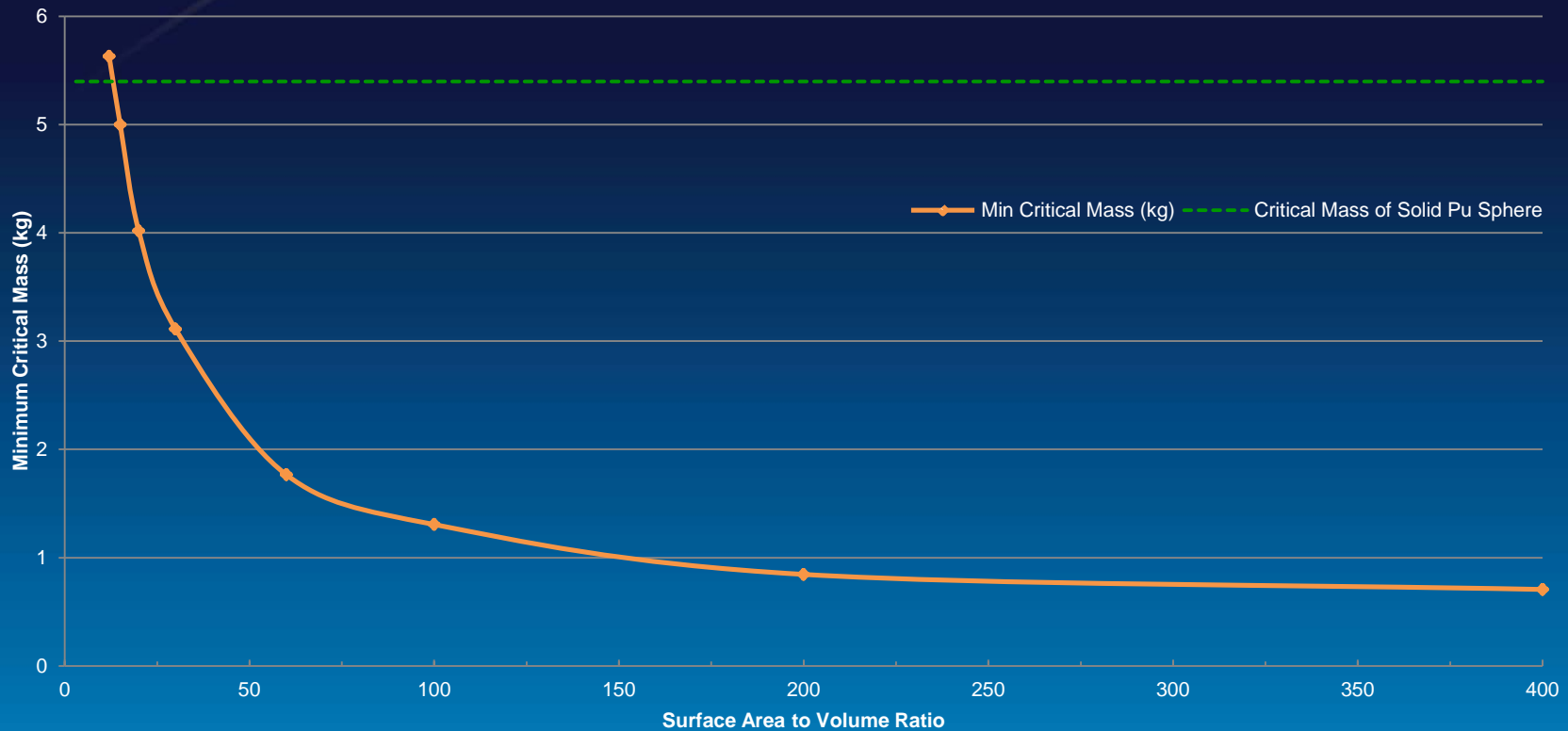
Full Data Set for One Shape



Results of Arrays of Cubes with varying SA-VOL ratios compared with Data from Figure 31 of LA-10860

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Derived Minimum Critical Mass Curve



SA-VOL Ratio vs. Minimum Critical Mass for Reflected Moderated Arrays

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