Update muX meeting 09/08

Michael Heines
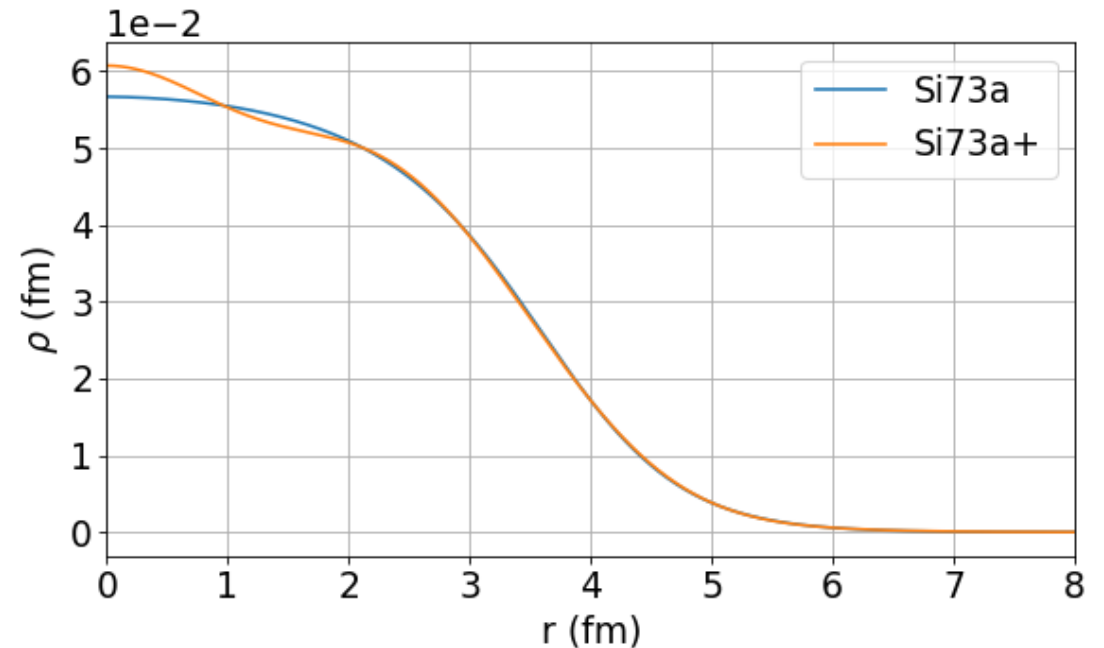
Effects of nuclear shape

- In our extraction:

$$\rho(r) = \cfrac{1}{1 + exp\left(4\ln(3)\cfrac{r - R_0}{t}\right)}$$

With t = 2.3 fm

- In reality:
  - Arbitrary charge distribution
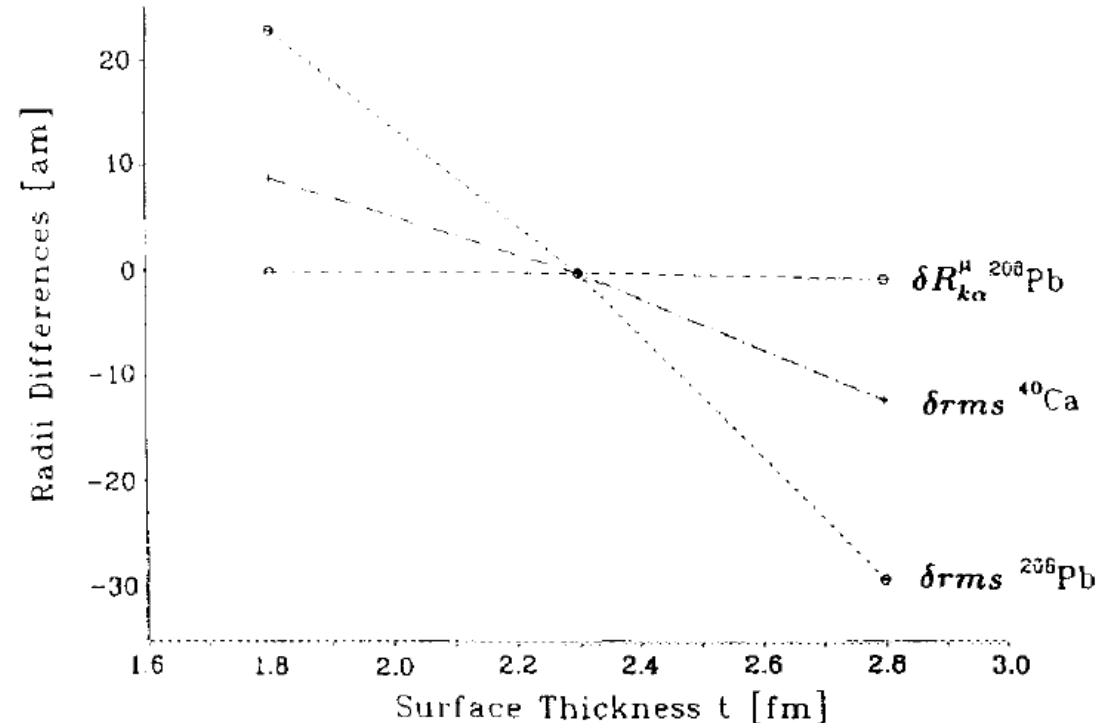 - Affects precision of output radius

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Extracting Barrett radii

- Barret moment:

$$< r^k e^{-\alpha r} > = \int_0^\infty r^{k+2} e^{-\alpha r} \, \rho(r) \, dr$$

- Barret radius:

$$3 \left[R_{k\alpha} \right]^{-3} \int_0^{R_{k\alpha}} r^{k+2} e^{-\alpha r} \, dr$$

- No nuclear shape sensitivity while keeping nuclear size sensitivity

- From theory input calculate transition energy as function of Barrett radius

[1] Fricke, G., et al. "Nuclear ground state charge radii from electromagnetic interactions." *Atomic Data and Nuclear Data Tables* 60.2 (1995): 177-285.

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RMS versus Barrett radius

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