LLNL Sensitivity Calculations

December 12, 2012

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LLNL-PRES-528693

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

Method and Assumptions

- Form χ^2

$$\chi^2 = \sum_i \frac{\left[O_i - (\alpha + \alpha^i_{shp})E_i - \alpha_B B_i\right]^2}{E_i + B_i + \sigma_{b2b} B_i^2} + \frac{\alpha^2}{\sigma^2} + \frac{\alpha_B^2}{\sigma_B^2} + \sum_i \left(\frac{\alpha^i_{shp}}{\sigma^i_{shp}}\right)^2$$

where

- Antineutrino spectrum shape error σ_{shp} is taken from arXiv: 1106.0687v4
- Abs. normalization, σ =1 for shape only
- Assume flat background B_i, σ_{b2b} =1%
- Energy Res. 10%/sqrt(E), 40% efficiency, 0.75 years dwell
- 1m^3 detector with no position resolution, ^{235}U core
- Vary S:B, background norm. σ_B

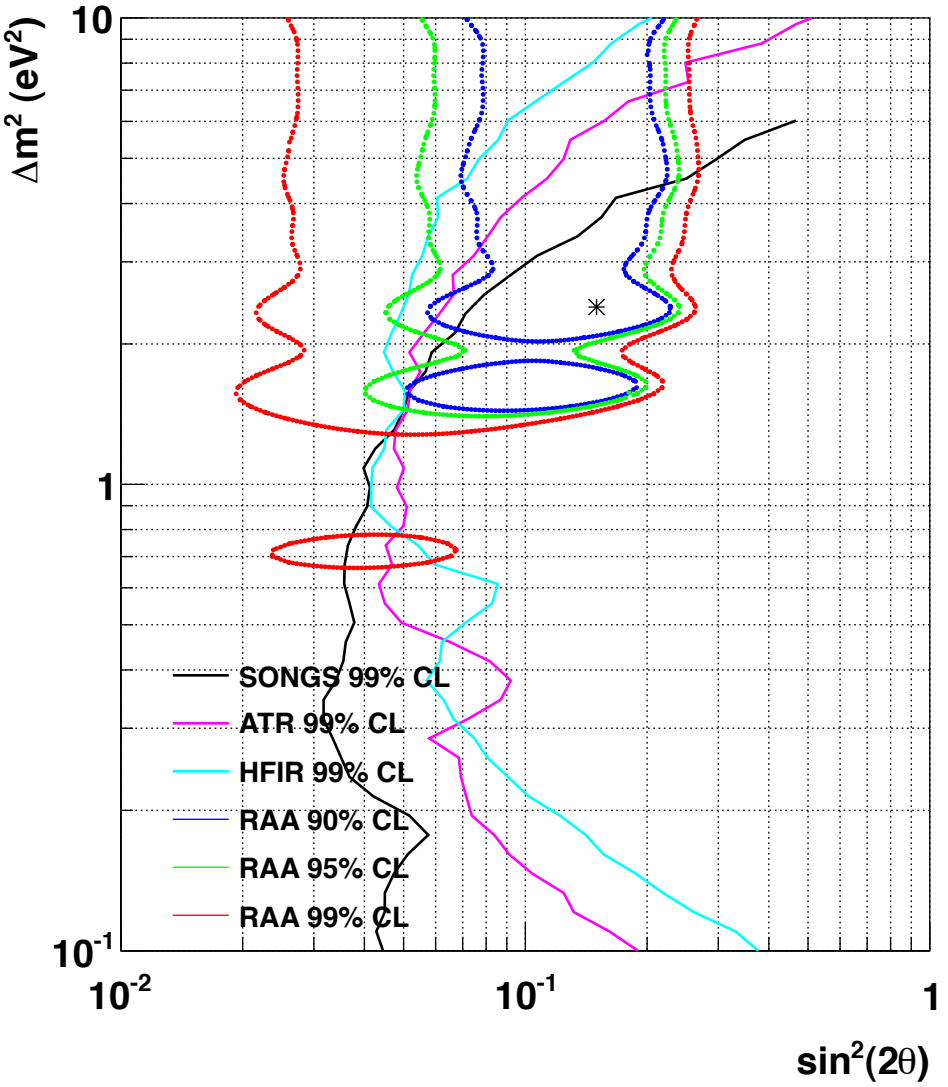
Comparison of sites

- L = 7m (HFIR)

  11m (ATR)

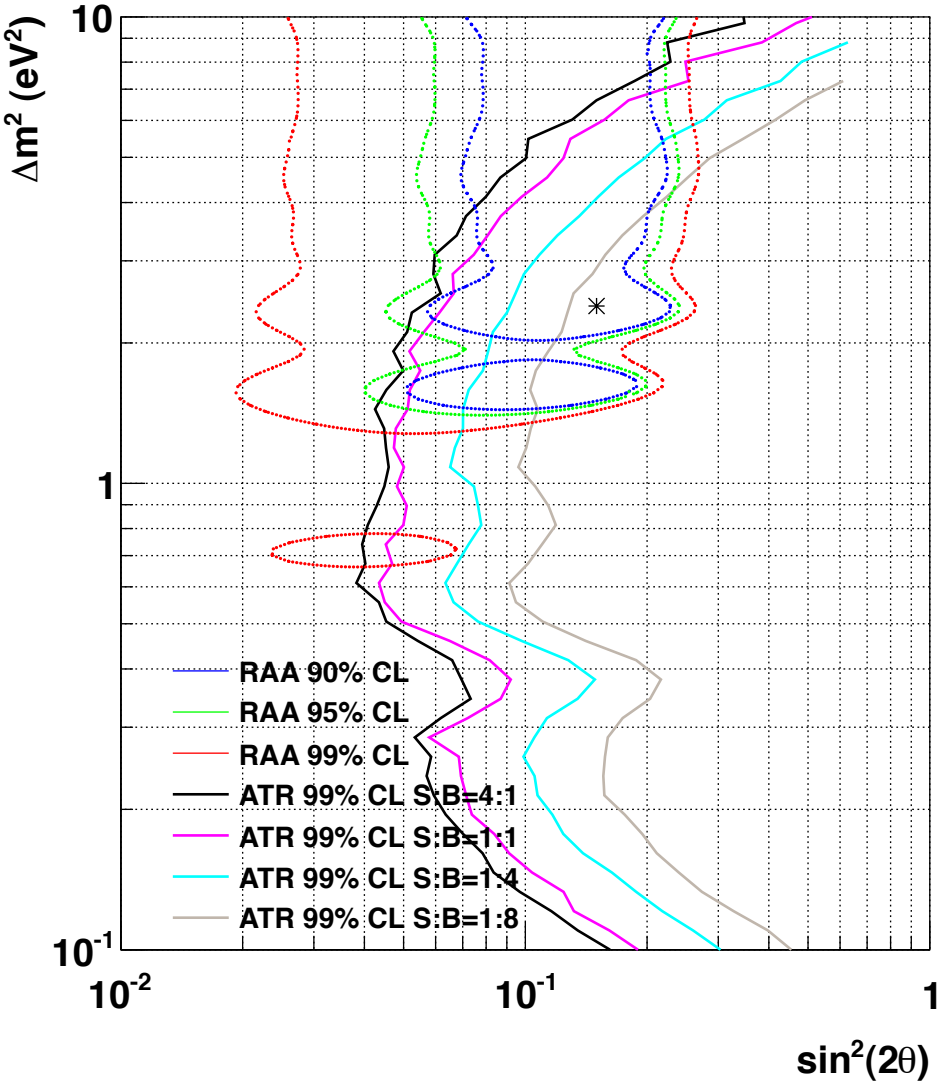
  24 (SONGS)
- $\sigma_{b2b} = \sigma_B = 1\%$
- S:B = 1:1 (ATR)

  8:1 (SONGS)
- Problems:
  - sells HFIR, and to lesser extent ATR, short due to lack of position resolution
  - no accounting yet for fuel composition evolution and error at SONGS PWR



Vary S:B, ATR site

- $\sigma_{b2b} = \sigma_B = 1\%$
- Control of background clearly very important



Vary σ_B, ATR site

- σ_{b2b} = 1%, S:B=1:1
- Knowledge of background important
- May differ for reactor correlated and reactor off backgrounds
- In practice, poor S:B may mean better σ_B?