SNO+ Overview

P G Jones on behalf of the SNO+ Collaboration

SNO+ Collaboration

University of Liverpool
- N McCauley, H J Rose, R Stainforth, J Walker

Sheffield University
- J McMillan

Lancaster University
- H O'Keeffe, L Kormos

University of Sussex
- E Falk, J Hartnell, S Peeters, A Back, J Sinclair, J Waterfield, R White

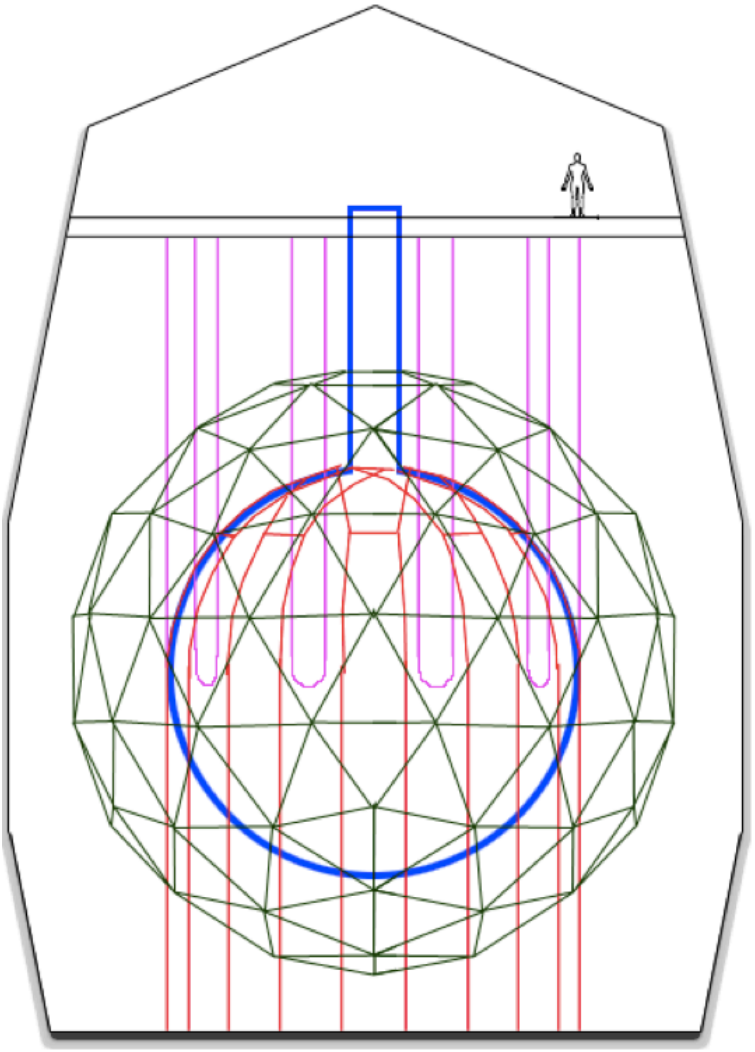
Queen Mary University of London
- F Di Lodovico, J Wilson, P Jones, M Mottram, E Arushnova, A Back, S Langrock

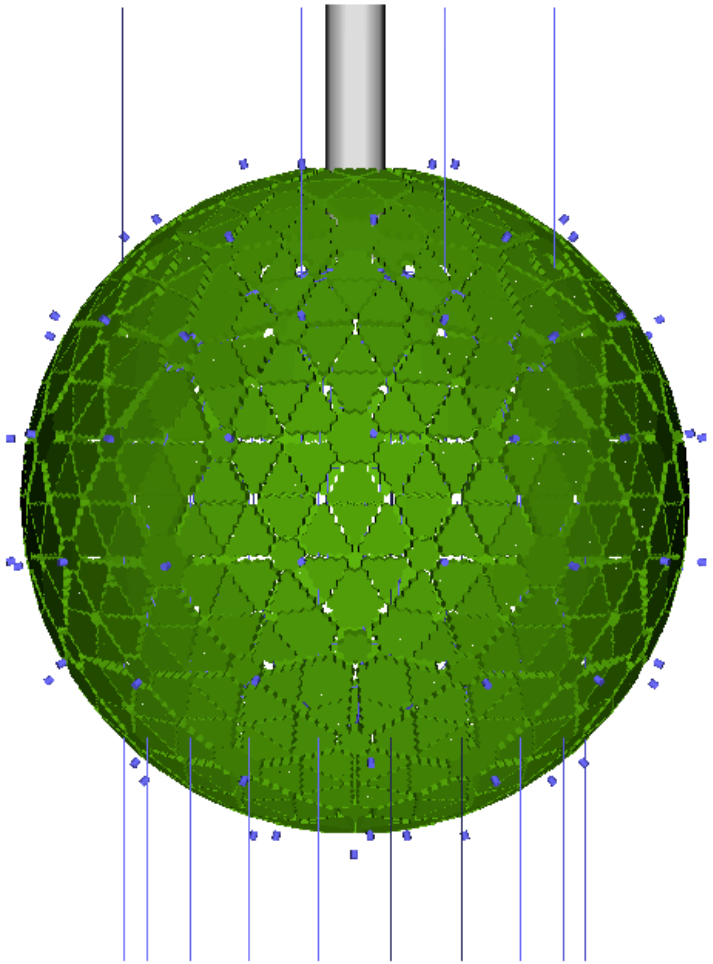
University of Oxford
- S Biller, N Jelly, A Reichold, L Segui, J Dungar, C Jones, J Ligard, K Majumdar

Aims

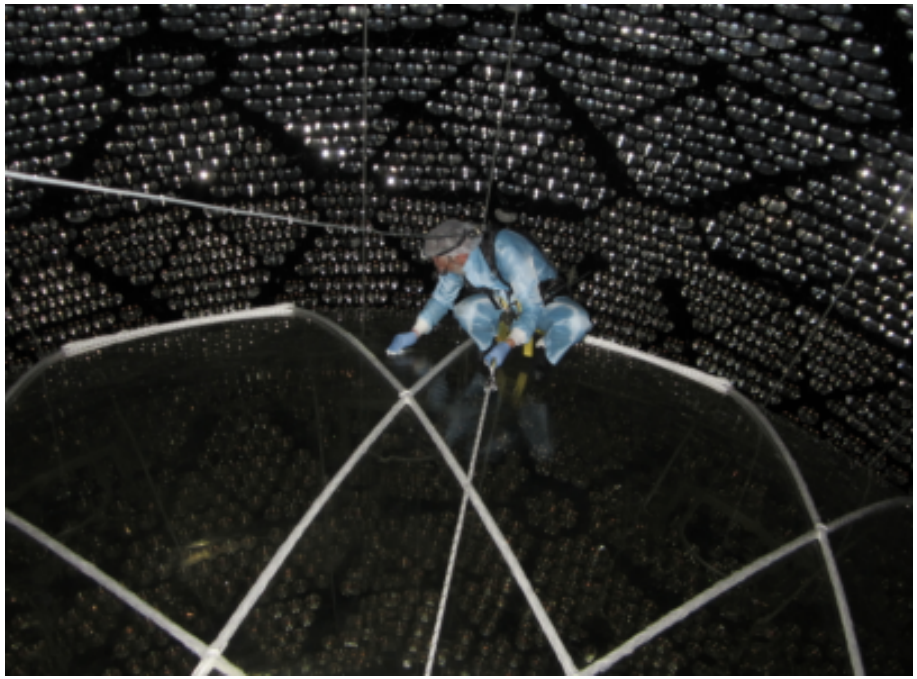
- Neutrinoless double beta decay
- Nucleon decay
- Solar neutrinos
- Geo neutrinos
- Reactor neutrinos
- Supernova neutrinos

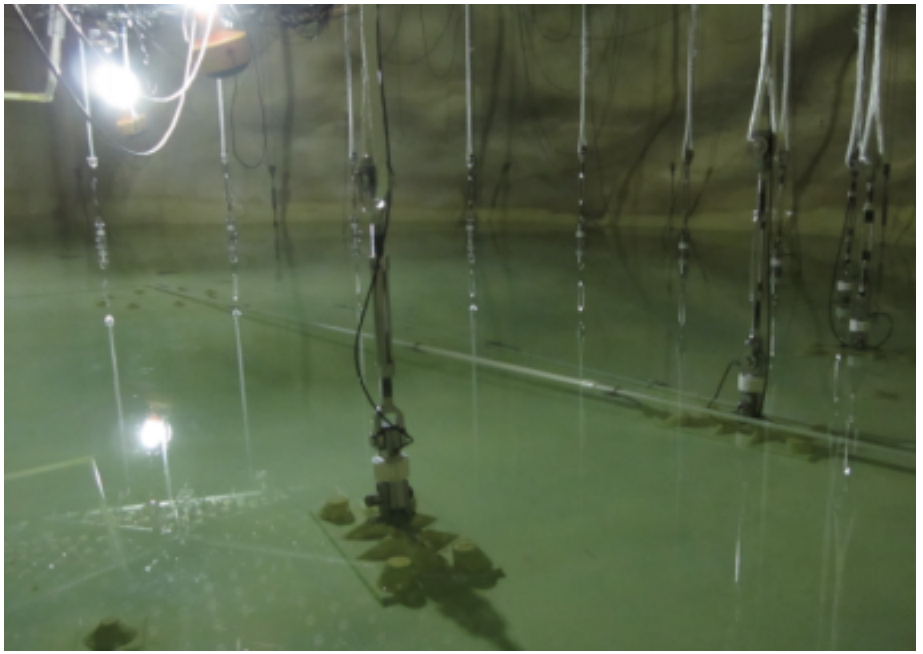
SNO+ Detector



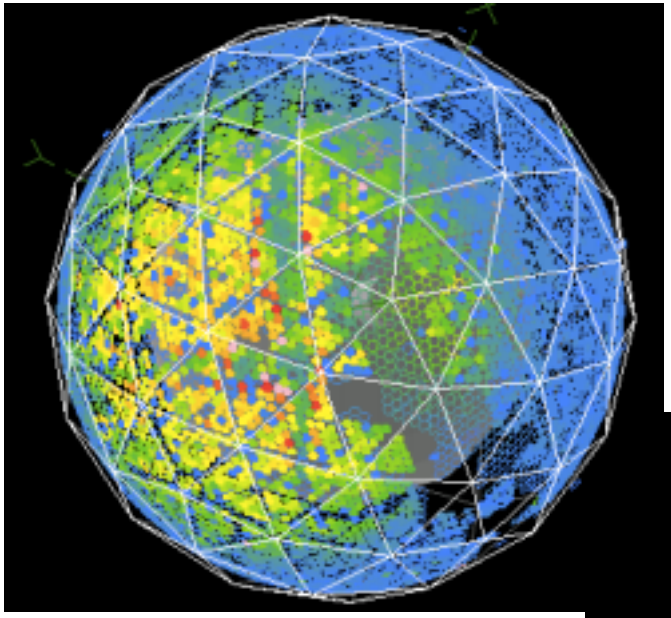


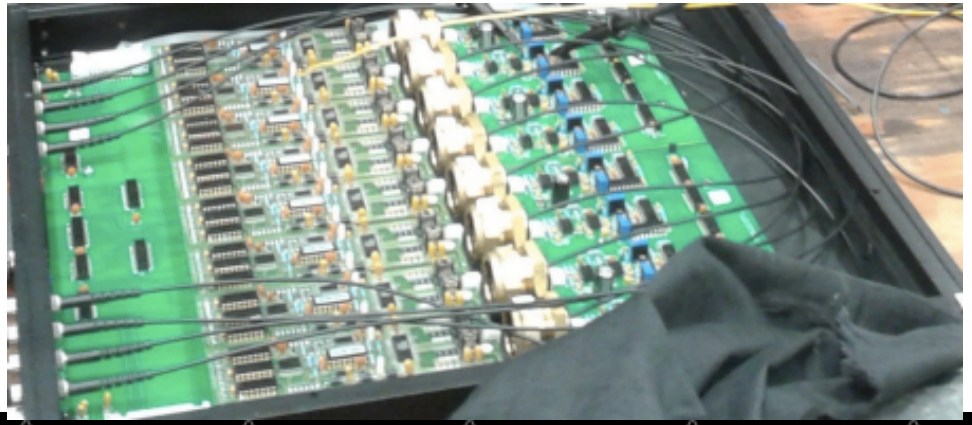
Progress

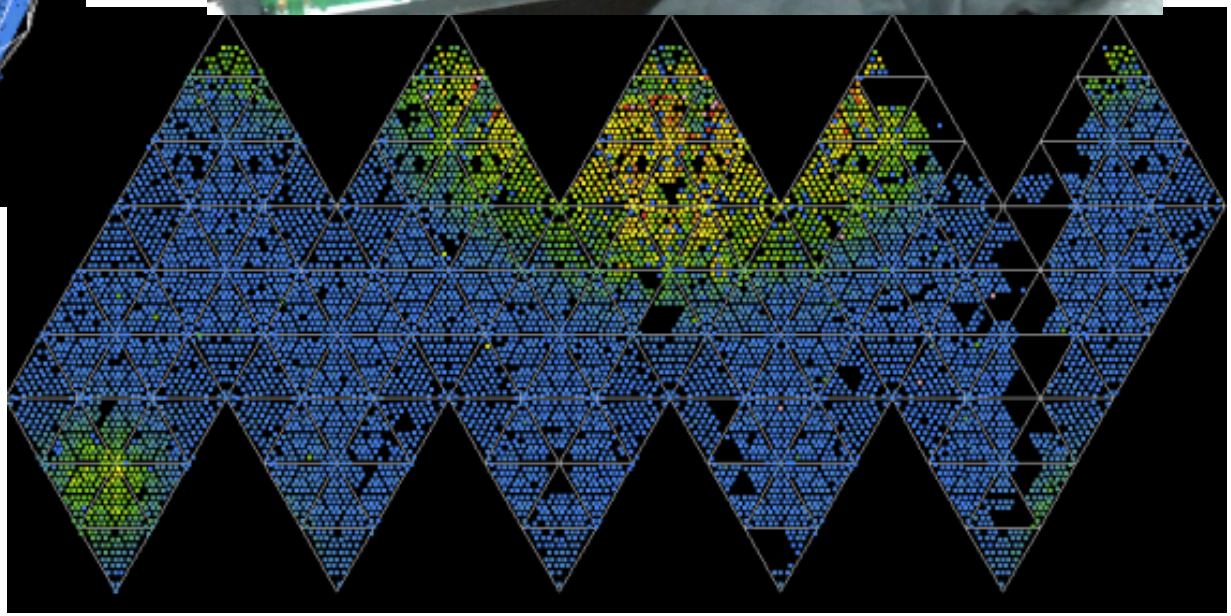




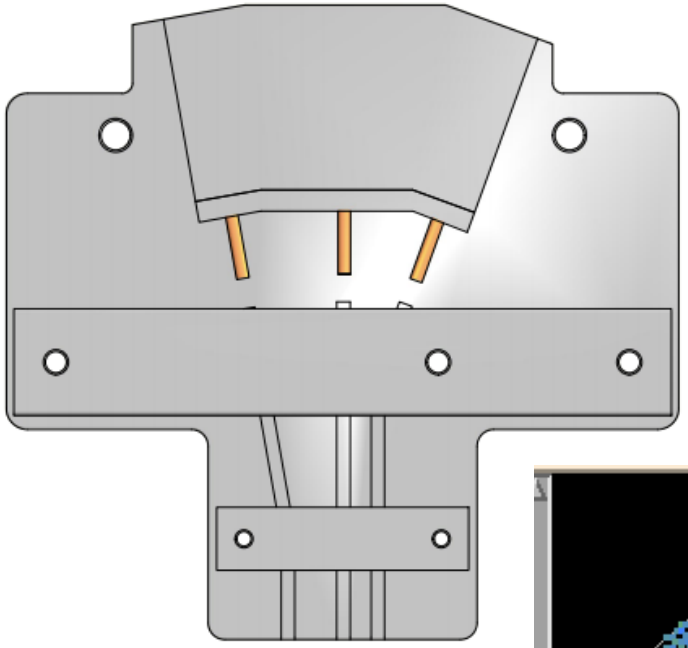
Optical Calibration - TELLIE

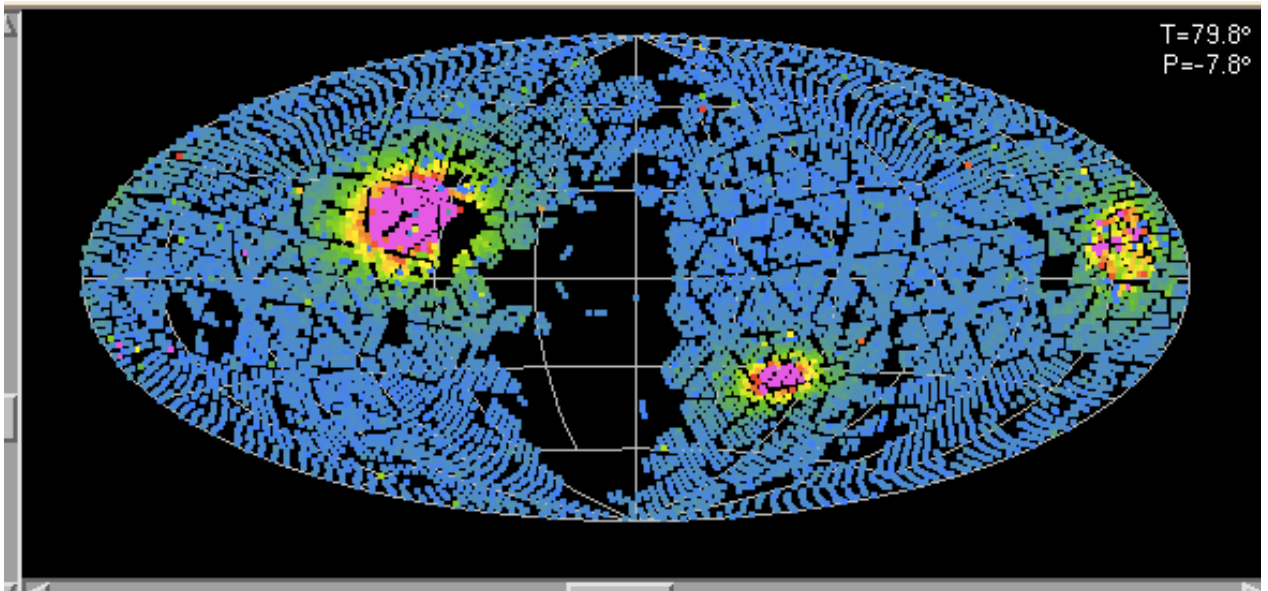






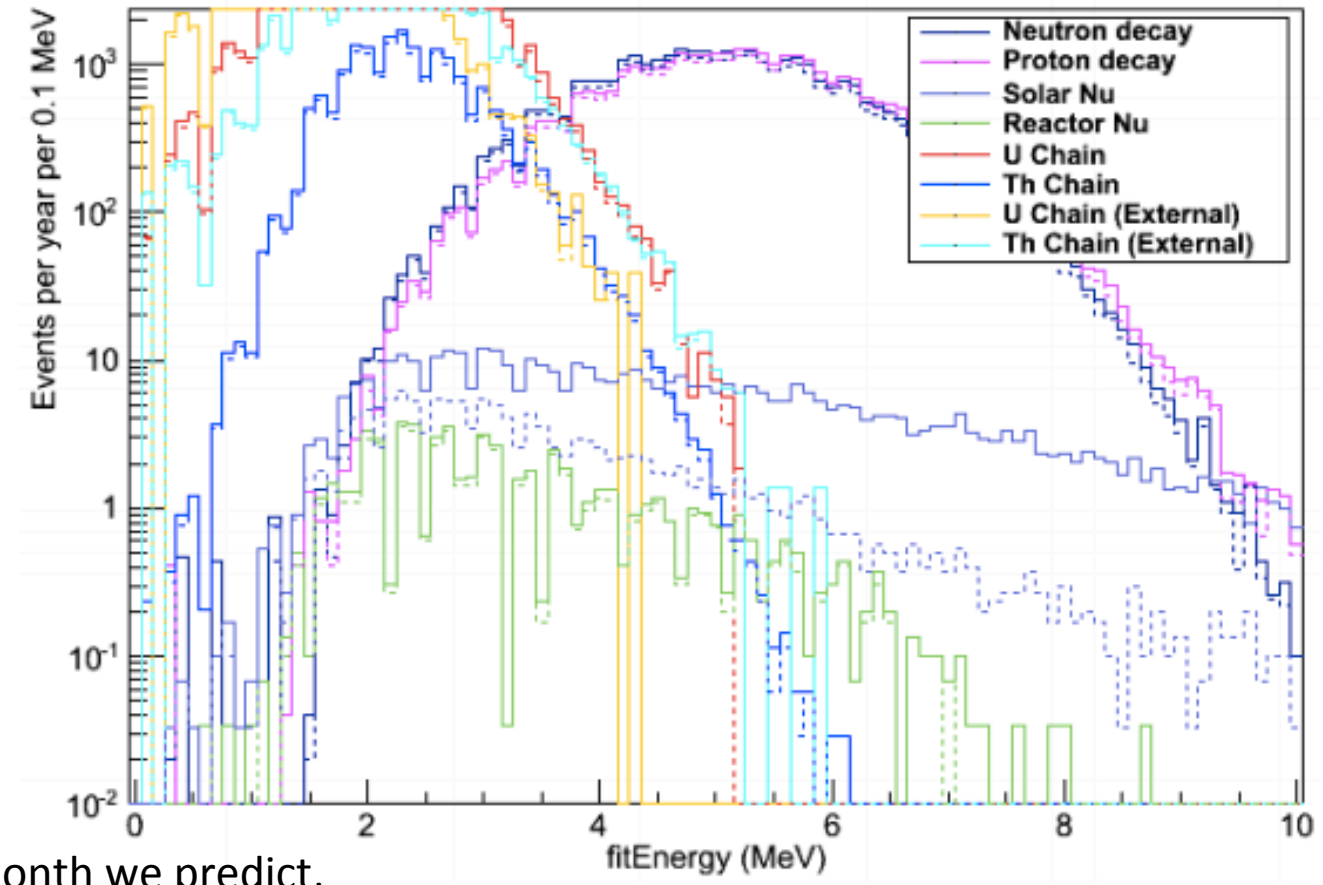
Optical Calibration - SMELLIE





Monte Carlo

Invisible Nucleon decay

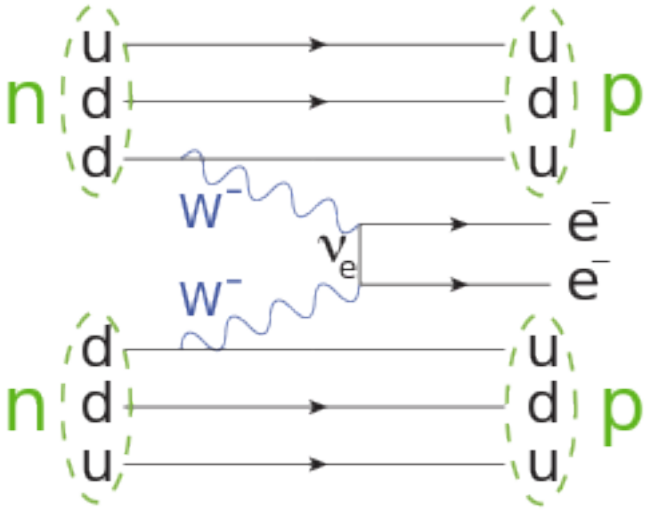


After 1 month we predict,

tau > 1.38 x 10^30 years neutrons, tau > 1.57 x 10^30 years for protons.

I. Coulter, "Modelling and reconstruction of events in SNO+ related to future searches for lepton and baryon number violation", DPhil Oxford TT 2013

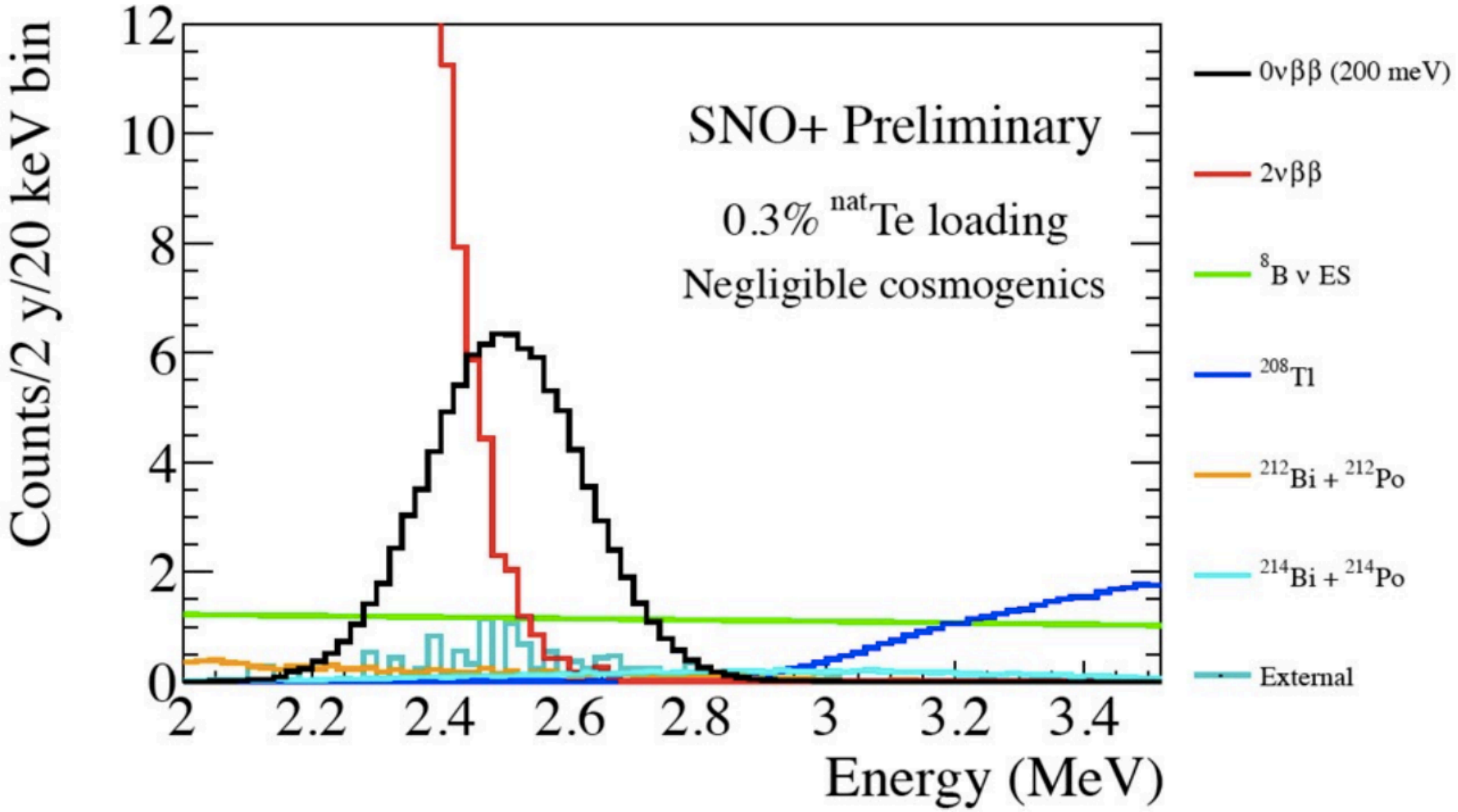
Double beta decay



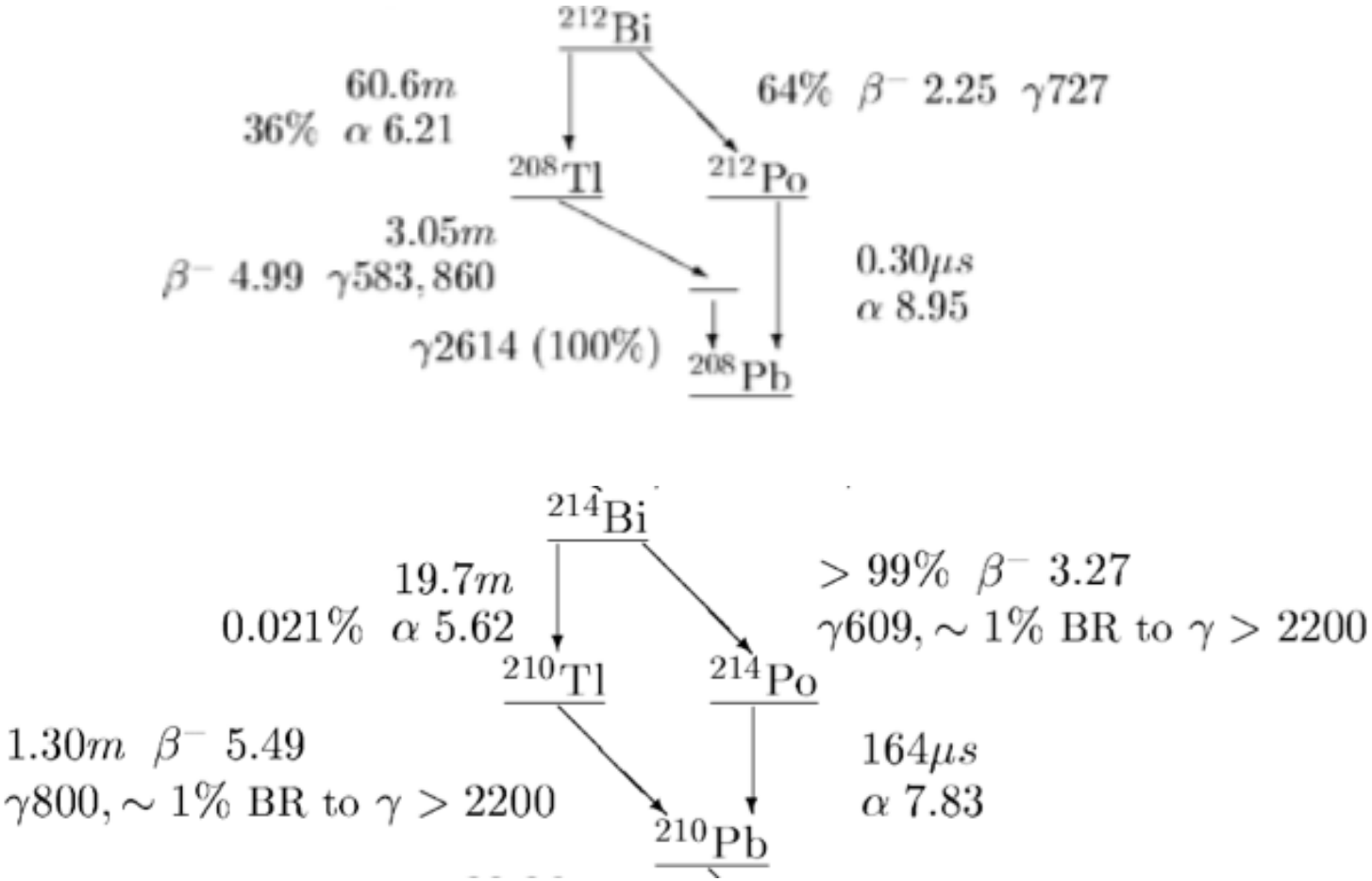
$$(T^{0\nu}_{1/2})^{-1} = G^{0\nu}|M^{0\nu}|^2 \left(\frac{\langle m_\nu \rangle}{m_e}\right)^2$$

$$\langle m_\nu \rangle = \left| \sum_{j=1}^{3} U_{ej}^2 m_j \right|$$

Spectra


SNO+ Preliminary
0.3% natTe loading
Negligible cosmogenics
Counts/2 y/20 keV bin
Energy (MeV)
0νββ (200 meV)
2νββ
8B ν ES
208Tl
212Bi + 212Po
214Bi + 214Po
External

Background Rejection



Sensitivity

- 1 year: 4e25 y ~ 100meV
- 5 year: 9e25 y ~ 70meV

$M^{0\nu} = 4.03$ IBM-2
$G^{0\nu} = 3.69e\text{-}14$
$g_A = 1.269$

Schedule

- Water fill this year
- Nucleon data this year
- Scintillator fill next year
- Te fill later next year

- Some Te already purchased using UK funds!