Nuclear Lunch Questions

For discussion on "Gravity Resonance Spectroscopy",10th September 2014
Reference: PRL **112**, 151105 (2014)

Cold neutron production and mirrors:

1) How are the cold neutrons for the experiment produced? (Mamun)
2) What kind of material was used to make the neutron mirrors? How is roughness and waviness of a neutron mirror defined? (Shamim)
3) What is the lifetime of neutrons trapped the neutron "waveguide" via these mirrors? Does this have anything to do with the neutrons losing energy when they strike the mirrors? (Linda)

The experiment:

4) When the absorber is replaced by a mirror (i.e. for the experiment described in this PRL) what are the allowed states of the neutrons? Should we think about these as resonant states? (Tyler)
5) How are the energies that the neutrons can absorb measured? (Nadyah)
6) What kind of neutron detector is used? What does it mean that the detector is "background optimized"? (Sushil)
7) In fig. 1, the plot has a relative transmission greater than 1, what does this signify? Is it physically possible? (Taya)

Tests of gravity:

8) What is a Yukawa length? How do we know the strong force is not playing a role? (Sudhanva)
9) How are the neutrons polarized? (Rekam)
10) Why do they coat the entrance foil with iron for spin-dependent searches? (Andrea)
11) How big is the effect of the earth's magnetic field on the spin of the neutron? (Brian)
12) What is the chameleon scenario, including the chameleon-matter interaction and the chameleon-photon interaction? (Arbin)
13) Please explain fig. 3 – what is n on the plot, and what are pendulum experiments? (Bijaya)
14) Could gravitational waves produce a transition between states, i.e. induce $E_n \rightarrow E_{n+1}$? (Phillips)