2014 SSI Contest

2014 SSI Challenge

- Answer the question:

> What would you propose as a next step if five years from now none of the currently planned experiments detect dark matter?

- Place your entry in the pink box by 18:00 Thursday August 14, 2014
- Winner will be announced Friday morning August 15
- Winner and runners-up will receive a prize

Previous questions and Winners: 2013

SLAC

- What exciting physics will you lecture about at the 2023 SLAC Summer Institute and why?

- "ν's: the precision frontier" A journey through the history of precision neutrino measurements and the new physics we have and can expect to learn along the way.
  - How we gained incredible precision on ν mixing parameters
  - How we now have hints for the MH
  - How IceCube has produced precise maps of the ν sky
  - Results from 0νββ decay and overall mass scale
  - Sterile ν's answer from μBooNE/Cosmic

Previous questions and Winners: 2012

SLAC

- What is the meaning of the discovery of the Higgs boson? If it is the `Higgs,' how would you name it?

The Meaning:

(1) To regular people, nothing
(2) To Dr. Peter Higgs, possibility of Nobel prize
(3) To students, no need to remember the various plots according to Higgs mass
(4) To professors, no need to teach the various plots according to Higgs mass
(5) To model builders, no need to produce parameter space to accommodate large range of Higgs mass.

The Name: I would name it `h' because:

(1) It has been called "Higgs"
(2) It has been a "Hot" issue for so long time
(3) It has just said "Hello" to us
(4) It must by a "Hopeful" particle to peep into future new physics

Previous questions and Winners: 2011

SLAC

- **What is the next unexpected discovery about the nature of the universe and what puzzle will it explain?**

The Discovery:

Within the next ten years we will unambiguously rule out General Relativity as the correct theory of gravitation on cosmological scales.

The Why: Precision measurements of BAO & SN1a together with cosmic shear, galaxy clustering and cluster abundance measurements provide very promising potential to observe a signature of a deviation of GR on large scales because a joint analysis of these signals is simultaneously sensitive to the growth and expansion history. The simplest way to conceive of these observables as testing the self-consistency of GR is by parameterizing the effect of the dark energy equation of state on the expansion history as w_d, and its effect on the growth rate of structure as w_g. Percent-level, independent constraints on w_d and w_g will become possible within the next 5-10 years, e.g., as surveys such as LSST or Euclid begin to provide exquisitely precise measurements of the positions and shapes of tens of billions of galaxies, allowing these surveys to test the self-consistency of describing the cosmic acceleration with a cosmological constant/vacuum energy density.

Previous questions and Winners: 2009

SLAC

- **What is the true revolution that is realized in Nature?***

- Although the WIMP miracle has historically motivated our musings on the nature of dark matter, we may be ignoring a tantilizing hint from nature right under our noses: the ratio of baryons to dark matter in the universe is O(1). This could be (1) a remarkable coincidence; (2) an anthropic selection effect; (3) or more interestingly a clue that the mechanisms for for baryon and dark matter production are related. I believe that the coming revolution will center on possibility (3). Accounting for this ratio in theories beyond the model is highly nontrivial. Indeed, models of baryogenesis and dark matter production are typically unrelated.

I believe that the coming revolution in physics will reveal the origin of this ratio, and that the scenario which nature has chosen has not yet been conceived by any theorist