

Paper(s) 5: Solar neutrinos and SNO – Particle Physics – Summer 2016

N. Berger, F. Wauters

hand in: Mo 11.07. (in the lecture)

Reference: *Measurement of the Rate of $\nu_e + d \rightarrow p + p + e^-$ Interactions Produced by ^8Be Solar Neutrinos at the Sudbury Neutrino Observatory*, Q.R. Ahmad *et al.*, Phys. Rev. Lett.**87**, 071301-1 (2001).

5.1 What is (or was) the *solar neutrino problem*? Which experiment started it all?

5.2 Why is the CC reaction only sensitive to ν_e , the NC equally to all flavors, and ES to all flavors but primarily to ν_e .

5.3 Which solar reaction is the neutrino source. What other nuclear processes in the sun produce neutrinos. Why is this particular one used in this experiment.

5.4 What does *fiducial volume* mean? What is the fiducial volume cut?

5.5 What are the *p.d.f.*'s and what do they do with them.

5.6 Compare Fig. 2 and Fig. 3 of *Phys. Rev. Lett.* 89, 011301 (2002) with Fig. 2 and Fig 3 of this paper. What is new (besides better statistics)?

5.7 Something from the paper I do not understand:

Note: Bring the paper/your notes with you to the discussion session, which should be seen as a *Journal Club*. Also, always look up a picture/description of the detector.