

Questions and answers - Deborah Harris Lecture

The following questions were submitted through Google Form. Some / all may have been answered in the Q&A session already. Nevertheless, we request our lecturers to provide written answers here for the benefit of those who could not attend that session. Thank you!

Slide 19. If I understand correctly, the rings are Cherenkov light. As the muon propagates, it gets closer to the detector and the ring becomes smaller. Shouldn't the inside of the ring fill up and be disk-like?

How close the muon gets to the edge of the tank depends on how much momentum it has when it is created, and how far from the tank it is when the momentum is lower than the Cerenkov threshold. (the Cerenkov threshold is when β is less than $1/n$). For the muon in slide 19, it must have started far enough away so that it went below Cerenkov threshold well before it got to the edge of the tank.

Slide 39. Estimated energy is sum of lepton and hadron energy. Since we know that some energy is not detected, the estimate will be systematically low. Is there any way to estimate the bias and make a correction, at least on average?

Experiments do have to estimate the bias and make a correction, but that estimate depends on models which may not perfectly reflect the kinematics of all the final state hadrons, which means there will be an uncertainty in that correction. We are trying now to make as many measurements of the interactions we can see (for example, by looking at how much momentum is missing in the direction transverse to the neutrino direction) to constrain the "missing" energy.