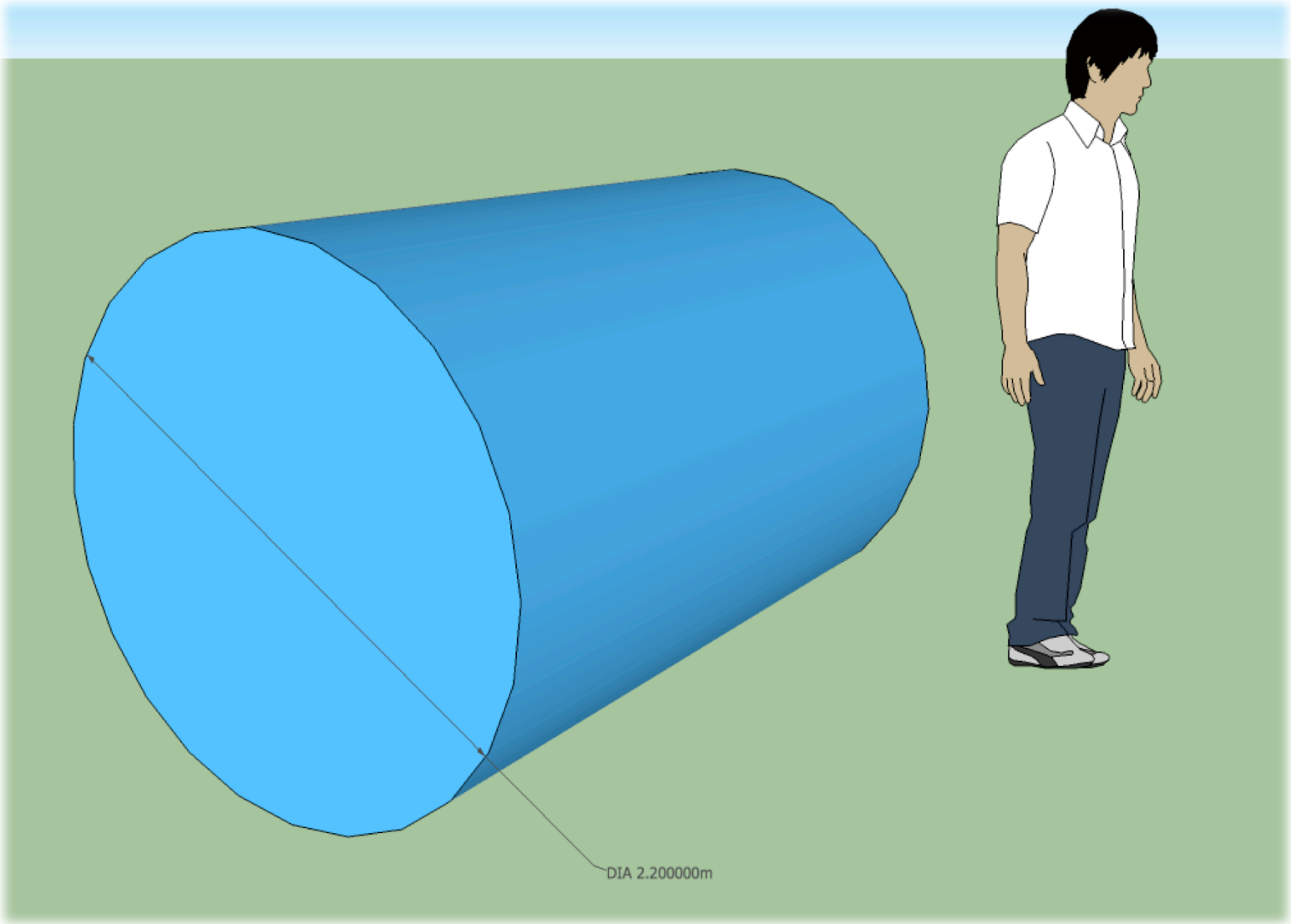
Simple Geometry



Materials & Dimensions

- 1.1 m radius cylinder with 3.2 m length
- water, Fe, Pb, C, CH_2, NaCl, $CaCO_3$
- density 1 g/cm^3, for water, standardized for others and will be placed in table on AARM wiki.
- Energies 280 GeV, 10 GeV, 30 GeV, 100 GeV, 1 TeV
- μ^-, μ^+

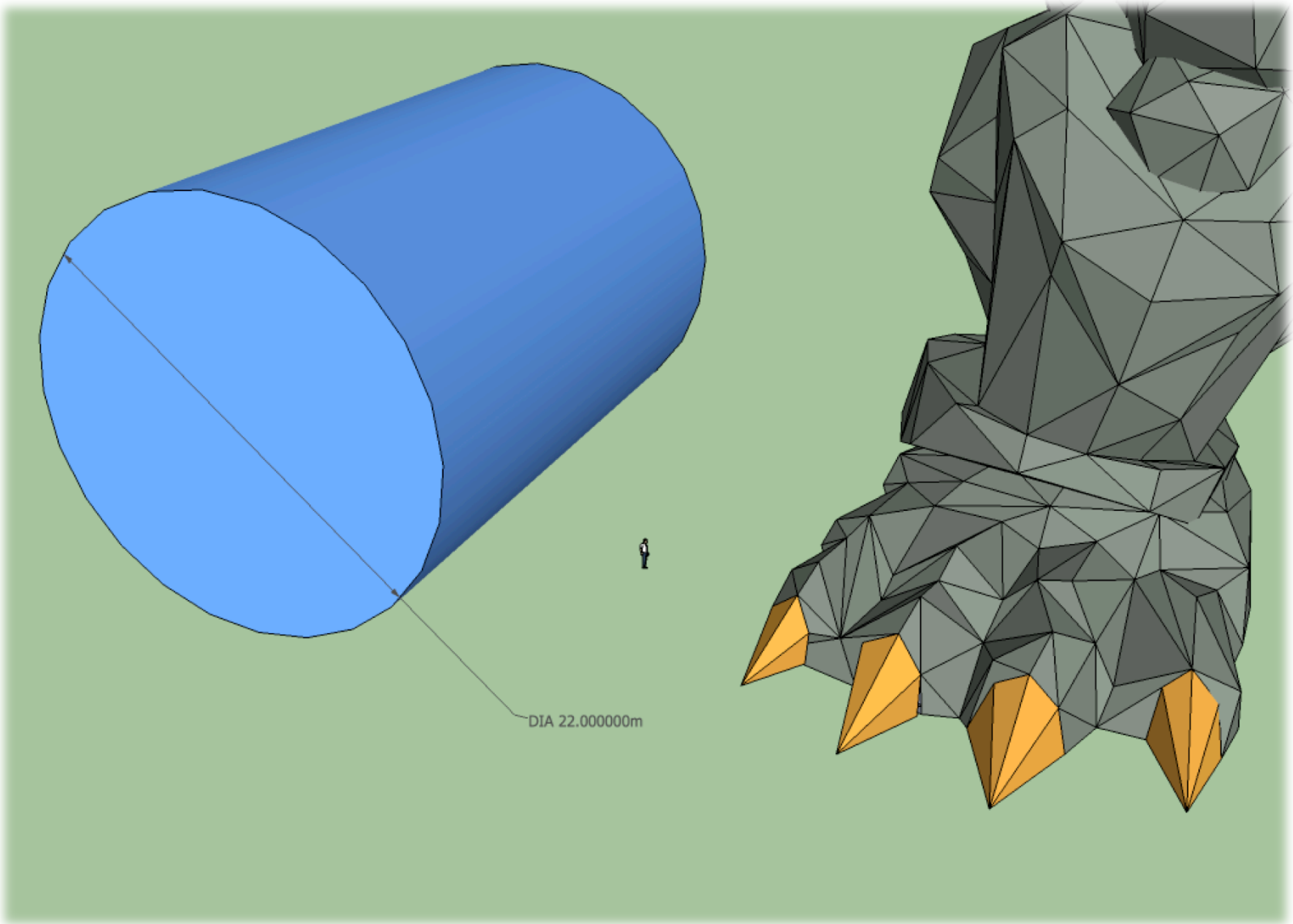
Physics Lists & Geant4 Versions

- Initially Geant4.9.3 used without Shielding list or μ-Nuclear
- Next Move on to Geant4.9.3 with Shielding and μ-Nuclear included (Dennis Wright port)
- Next use Geant4.9.4 with μ-Nuclear

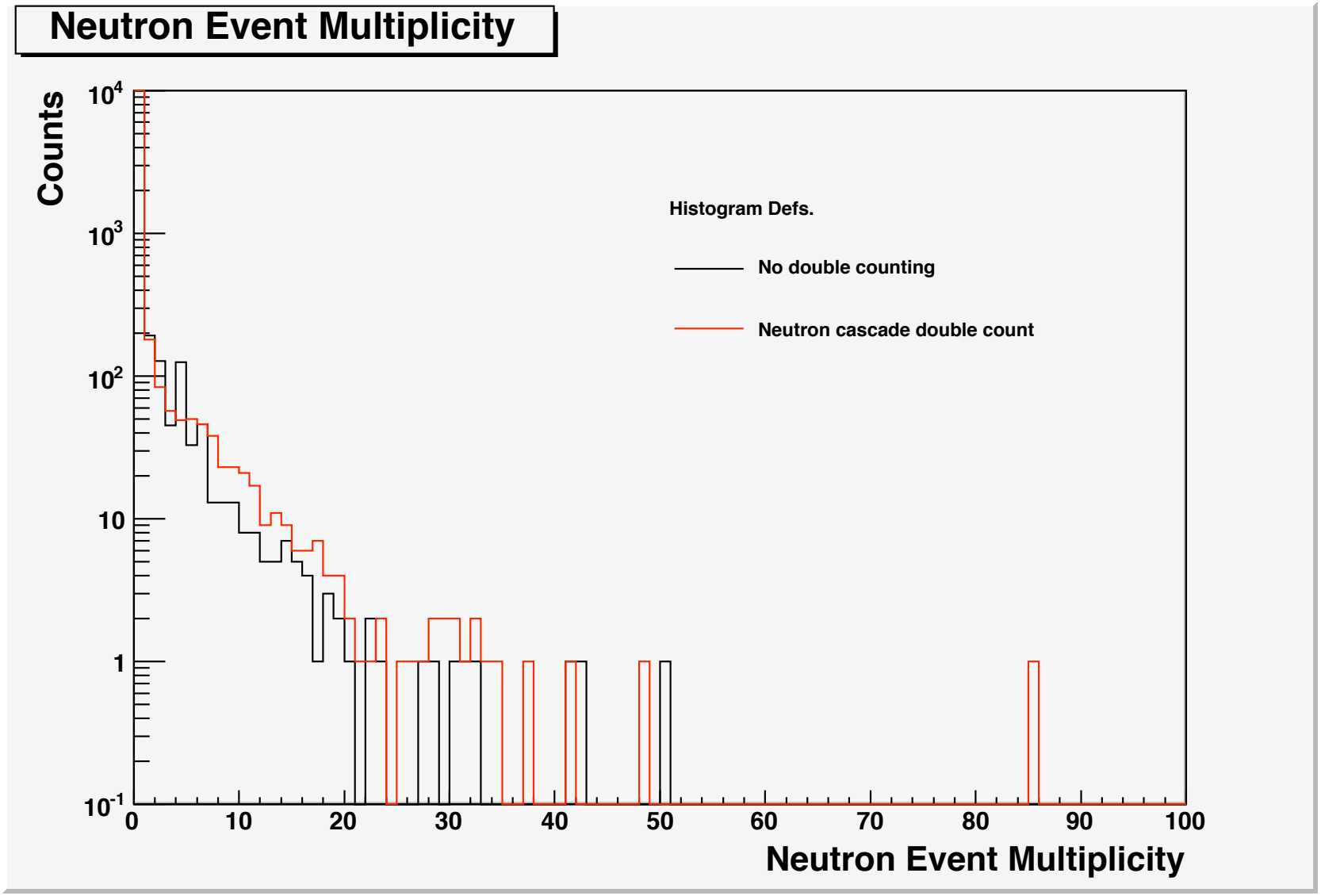
Fiducialization & Counting

- For water inner 1.0 m radius and 1.2 m length sensitive det.
- All particle interactions are tracked and every track is retained
- The above requires 14 Gb per 10,000 primaries in plain text
- 10,000 primaries run in 111 minutes on a single dual-core processor
- Should probably find a way to reduce the retained data one way is to throw away most of the μ hits in the sensitive detector since they basically go straight
- The full tracking should allow (with some carefully made algorithms) to avoid the “double counting” issue which has been mentioned

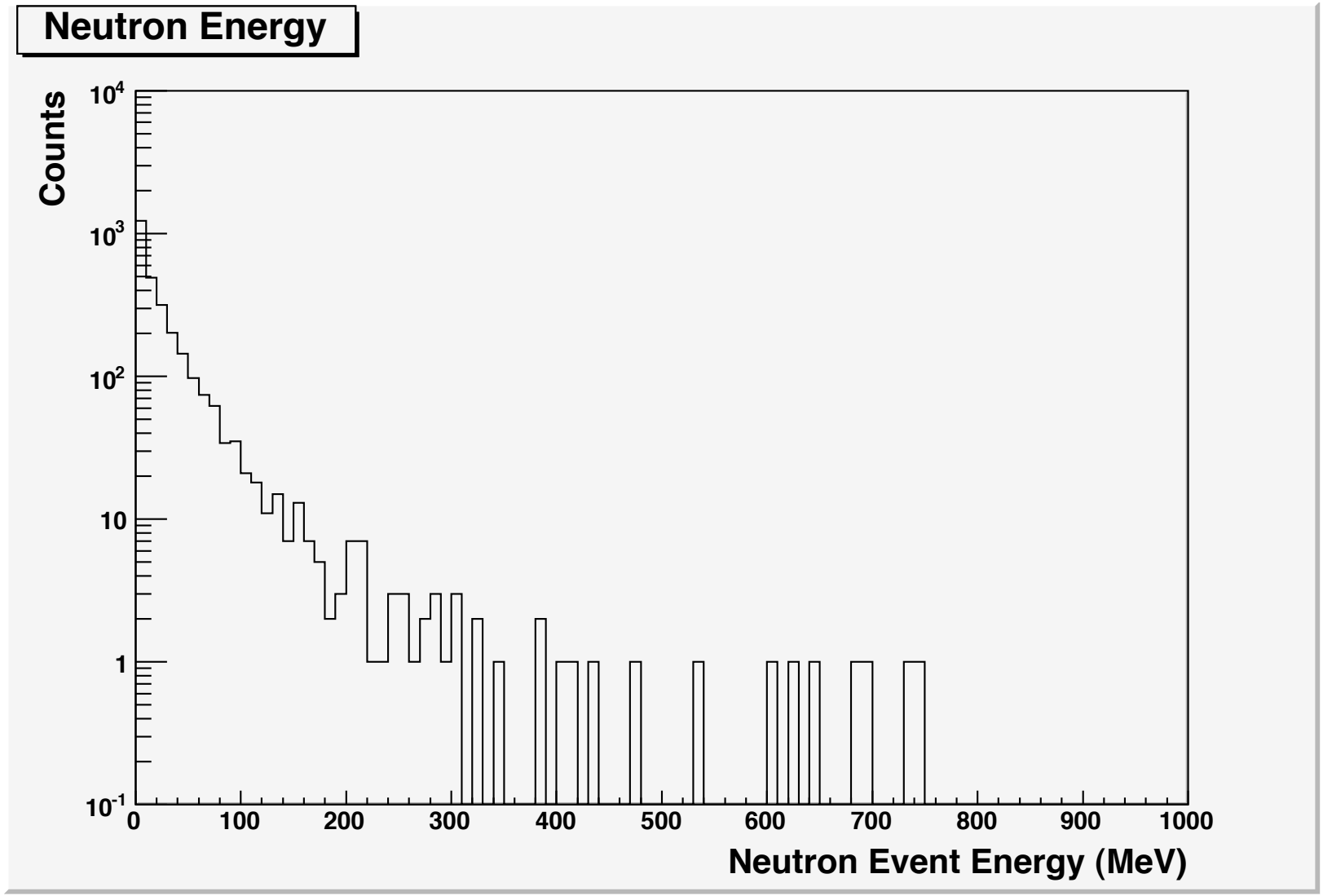
…But Large!



Neutron Event Multiplicity (10k Ev.)



Neutron Start Energies (10k Ev.)



Status & Direction

- Using Geant4.9.3 without "Shielding" physics list or μ-Nuclear
- Ran 50,000 primaries with H_2O and full tracking ~200 Gb
- Fiducial volume unsegmented sensitive detector
- All vertices can be fully reconstructed
- Cut out 90 – 95% of pure μ events to save space
- Run ~500,000 primaries on each configuration and energy originally suggested
- Compile Geant4.9.4 and "special" Geant4.9.3+Shielding+μ-Nuclear at University of Minnesota and run previous sets
- Continue to identify the best observables both for large scale assessments of neutron fluxes and for comparison to microscopic interaction data.
- Compare all data to Fluka (via. Toni Empl)