The Super-KAVE:
a 3D Immersive Event Display

Kate Scholberg, Duke University

Credits

Ben Izatt: UC Berkeley undergrad, working at Duke last summer

Nick Bodnar: Duke physics undergrad, wrote first code version

Dave Zielinski, Ryan McMahan, Rachael Brady: DiVE staff

Alex Himmel
Feedback from Duke Neutrinos, Ed Kearns

DiVE

vis.duke.edu/dive

The Duke immersive Virtual Environment (DiVE) is a 6-sided CAVE-like virtual reality theater.

- A “CAVE” virtual environment: 3m x 3m x 3m
  stereoscopic rear-projected room
- wireless head and hand tracking and real-time graphics
- 4 walls + floor + ceiling screens with projected graphics
  (1050x1050 pixels per screen)
- Stereo glasses provide depth perception
- Handheld wand/joystick allows interaction with objects
- Used for numerous interdisciplinary studies:
  molecule visualization, brain structure, math,
  cognitive experiments,...
- Downside: not very portable

SK geometry created using `syzygy` library: cylinder, ID tubes, OD tubes

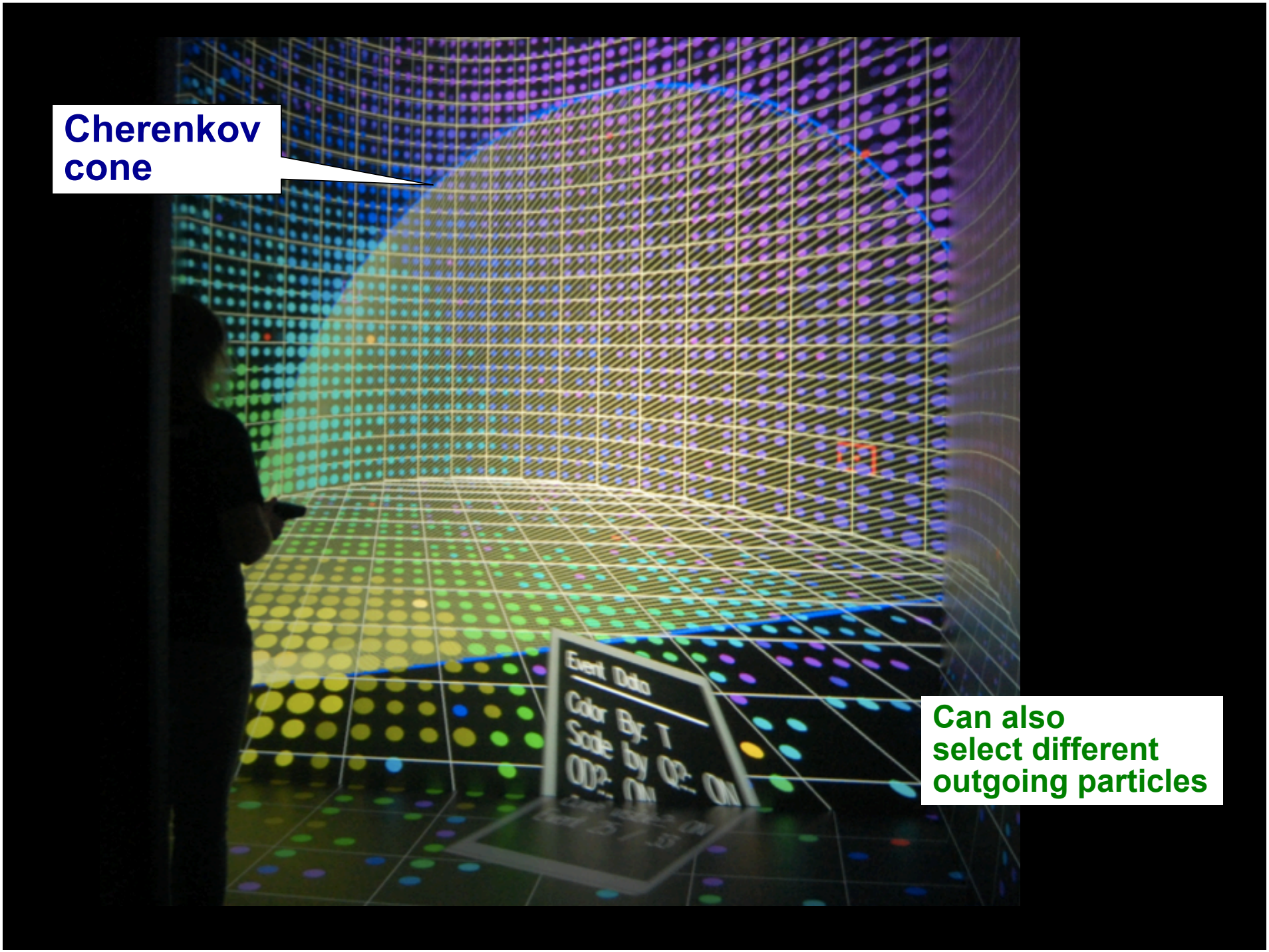
Info in SK ZBS files converted to PMT, time, charge + MC truth for particles

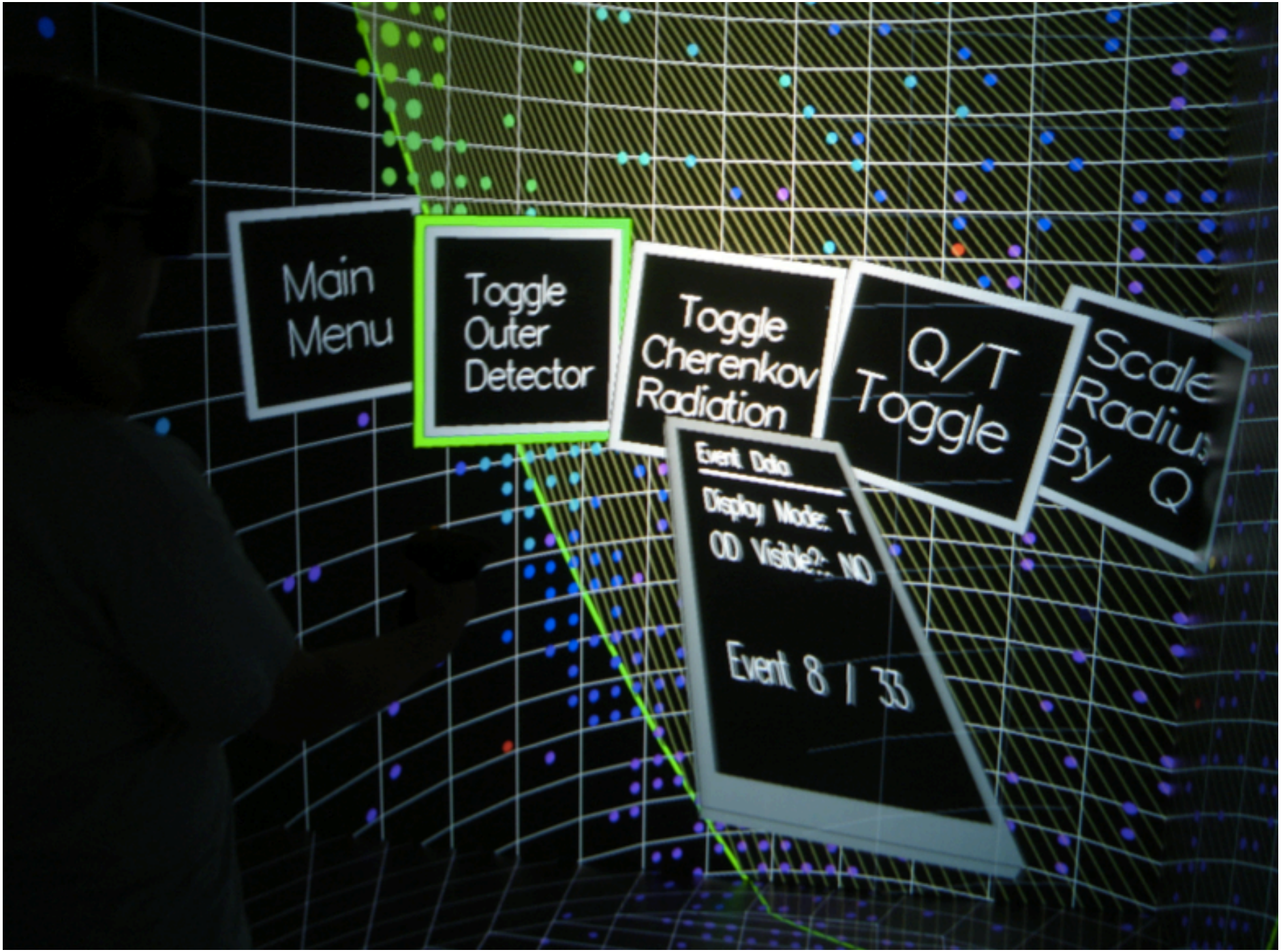
Menu allows selection of display mode, and also particle to display

Interaction vertex drawn as sphere

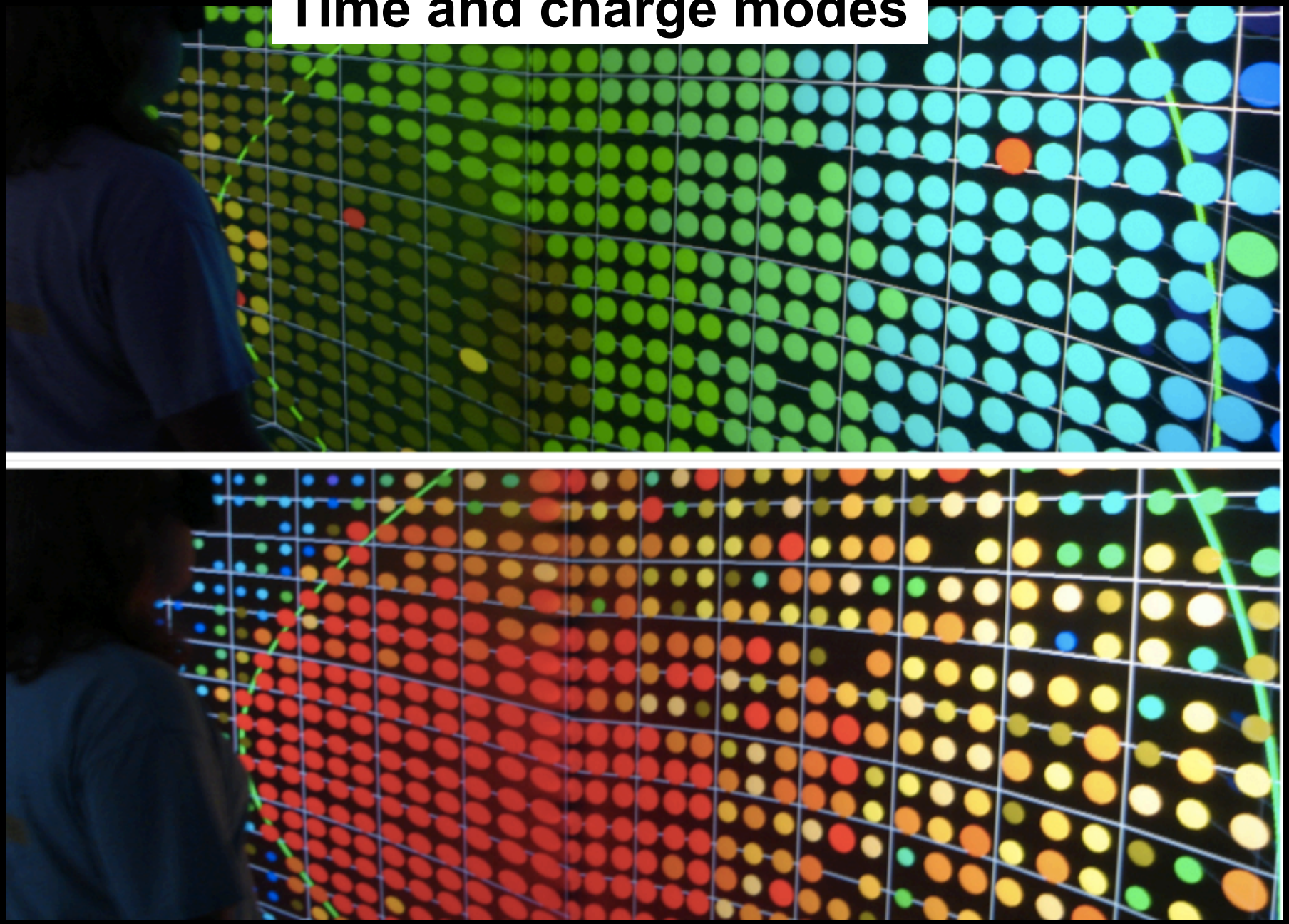
Cherenkov cone can also be shown

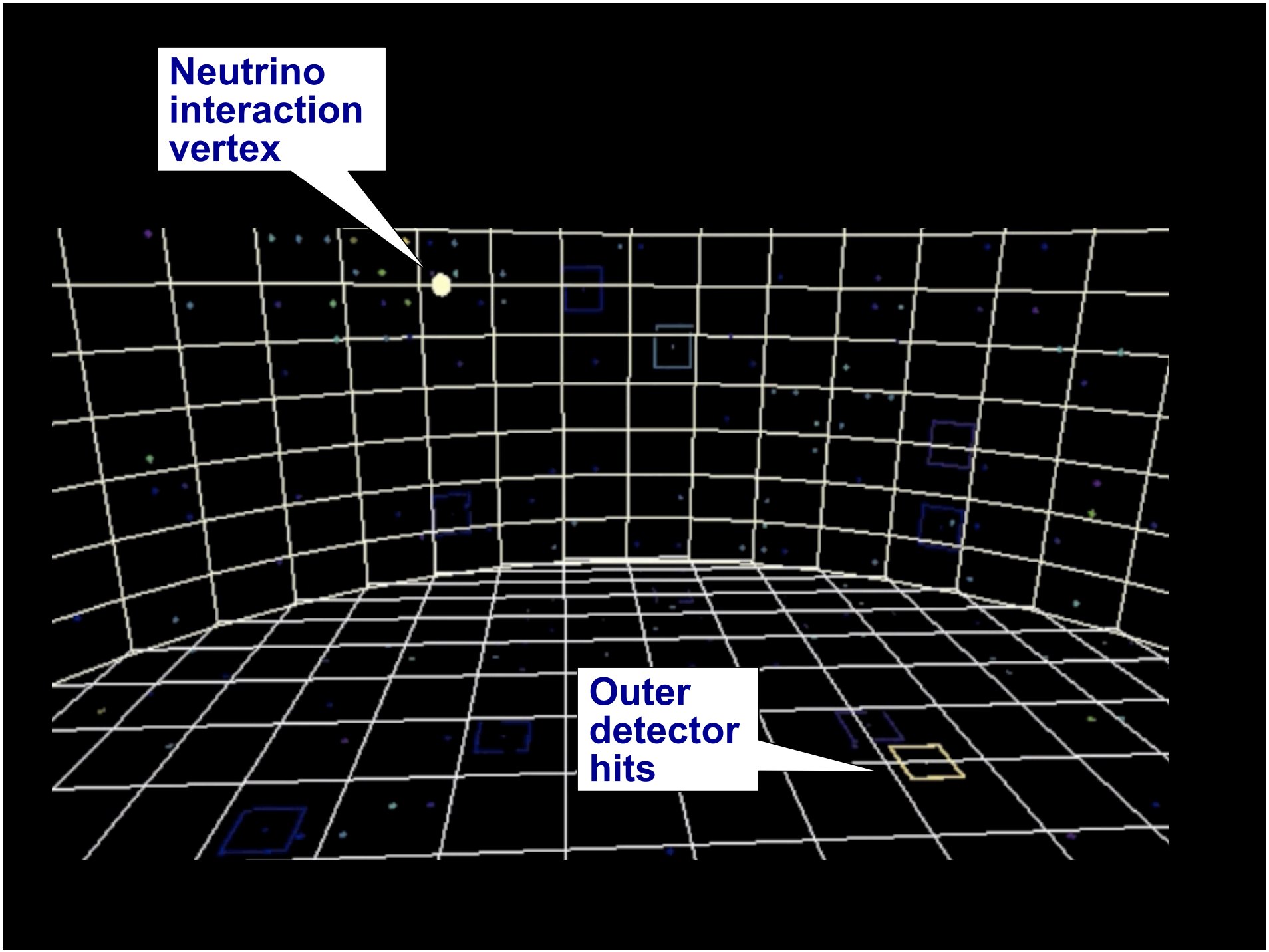
User can fly around the detector!


Cherenkov cone
Event Data
Color By: T
Can also select different outgoing particles


Main Menu
Toggle Outer Detector
Toggle Cherenkov Radiation
Q/T Toggle
Scale Radius By Q
Event Data
Display Mode: T
OD Visible?: NO
Event 8 / 33

Time and charge modes




Neutrino interaction vertex
Outer detector hits

Videos

http://www.phy.duke.edu/~schol/superkave/

"DIvE view": looking to the DIvE
"Head view": view from stereo glasses

Supernova video: real time SN burst from an old Nuance supernova file (relative event time information included)

Future Work

- Some minor aesthetic tweaks needed
- Display hit times by time
- Interactive fitting? Could move vertex/direction

- Put in HK geometry: the Hyper-KAVE

- Outreach expansion: port to other Caves;
  more detectors (IceCube is interested)

- Collaborating with DiVE director Regis Kopper
  on interdisciplinary NSF proposal
  (physics + human-centered computing)