

Visualizing .i3 Files



Zach Griffith
UW-Madison
IceCube Bootcamp 2018
Madison, WI



What is an .i3 File?

- The standard file format for storing IceCube data
- Contains all the necessary information about IceCube events
- Information is categorized into different "frames"

```
Level2_IC86.2015_data_Run00127619_Subrun00000050_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000051.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000051_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000052.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000052_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000053.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000053_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000054.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000054_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000055.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000055_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000056.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000056_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000057.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000057_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000058.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000058_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000059.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000059_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000060.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000060_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000061.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000061_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000062.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000062_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000063.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000063_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000064.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000064_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000065.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000065_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000066.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000066_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000067.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000067_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000068.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000068_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000069.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000069_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000070.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000070_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000071.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000071_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000072.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000072_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000073.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000073_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000074.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000074_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000075.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000075_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000076.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000076_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000077.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000077_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000078.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000078_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000079.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000079_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000080.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000080_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000081.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000081_IT.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000082.i3.bz2
Level2_IC86.2015_data_Run00127619_Subrun00000082_IT.i3.bz2
/data/exp/IceCube/2016/filtered/level2/0301/Run00127619_21 $
```

.i3 Frames



Contextual Info: typically 1 per run, separate file

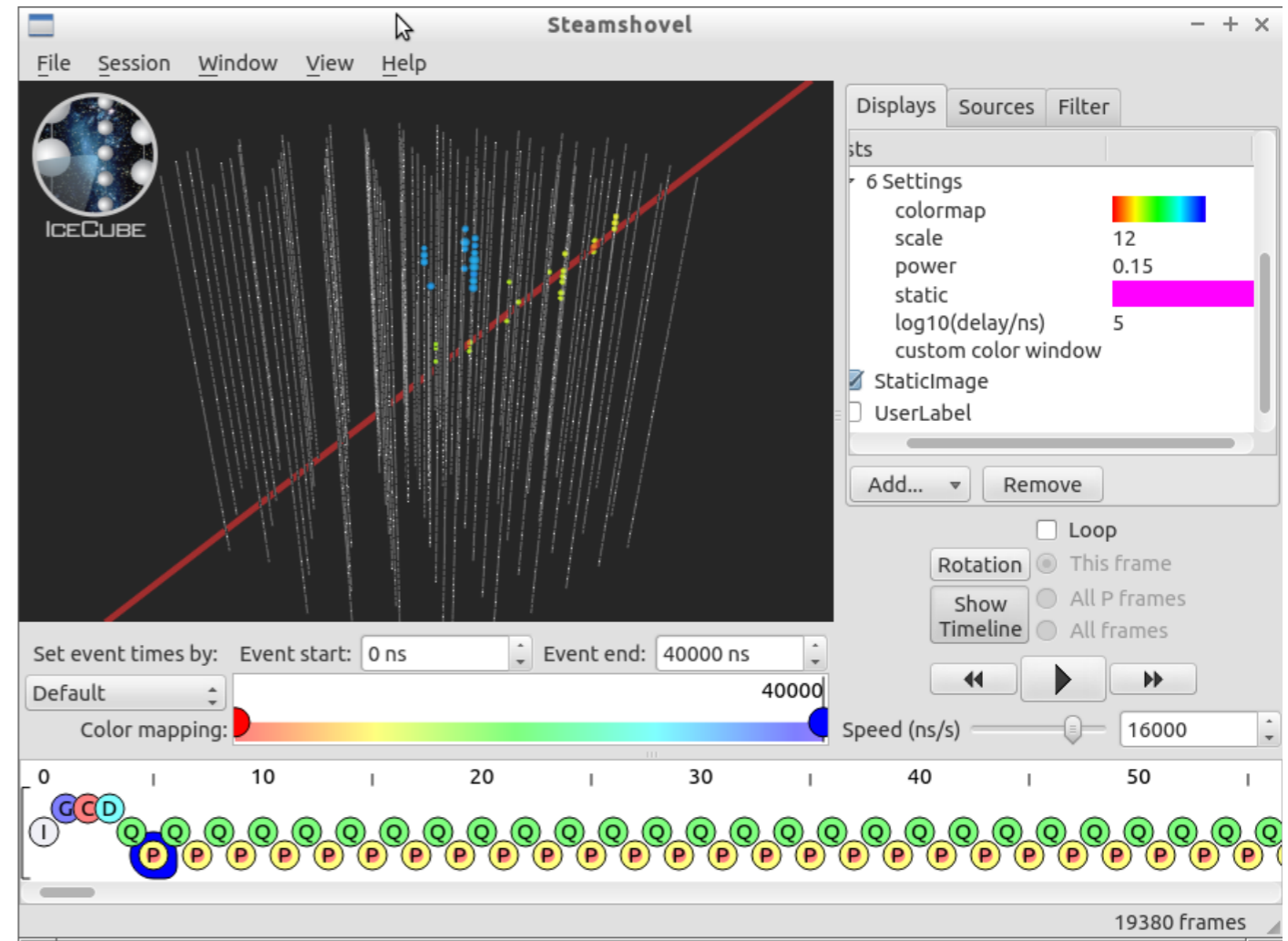
- I (TrayInfo): processing history
- G (Geometry): DOM coordinates
- C (Calibration): Waveform unit calibration
- D (Detector Status): useful DOM status information

Event Info: 1 per event

- Q (DAQ): Basic event info (e.g. charges)
- P (Physics): Q+Higher level event info (e.g. reconstructions)

What is steamshovel?

- Tool for 3D visualization of IceCube events in a GUI



- To use:

1. Enter an IceTray environment

- ◆ on the VM: `~/i3_software/combo/build/env-shell.sh`

2. For a file in .i3 format:

- ◆ on the VM: `steamshovel GCD-File.i3(.gz|.bz2) Data.i3(.gz|.bz2)`

Useful Links

- steamshovel documentation:
 - ◆ http://software.icecube.wisc.edu/offline_trunk/projects/steamshovel/index.html

Demo:
using steamshovel

Useful commands in dataio-pyshovel

- **x**: open a module in XML format
- **enter**: open a module in a cleaned, human-readable format
- **g**: enter a frame number to go to
- **i**: enter an ipython shell
- **L**: import a library
- **h**: list available commands

Demo:
using dataio-pyshovel