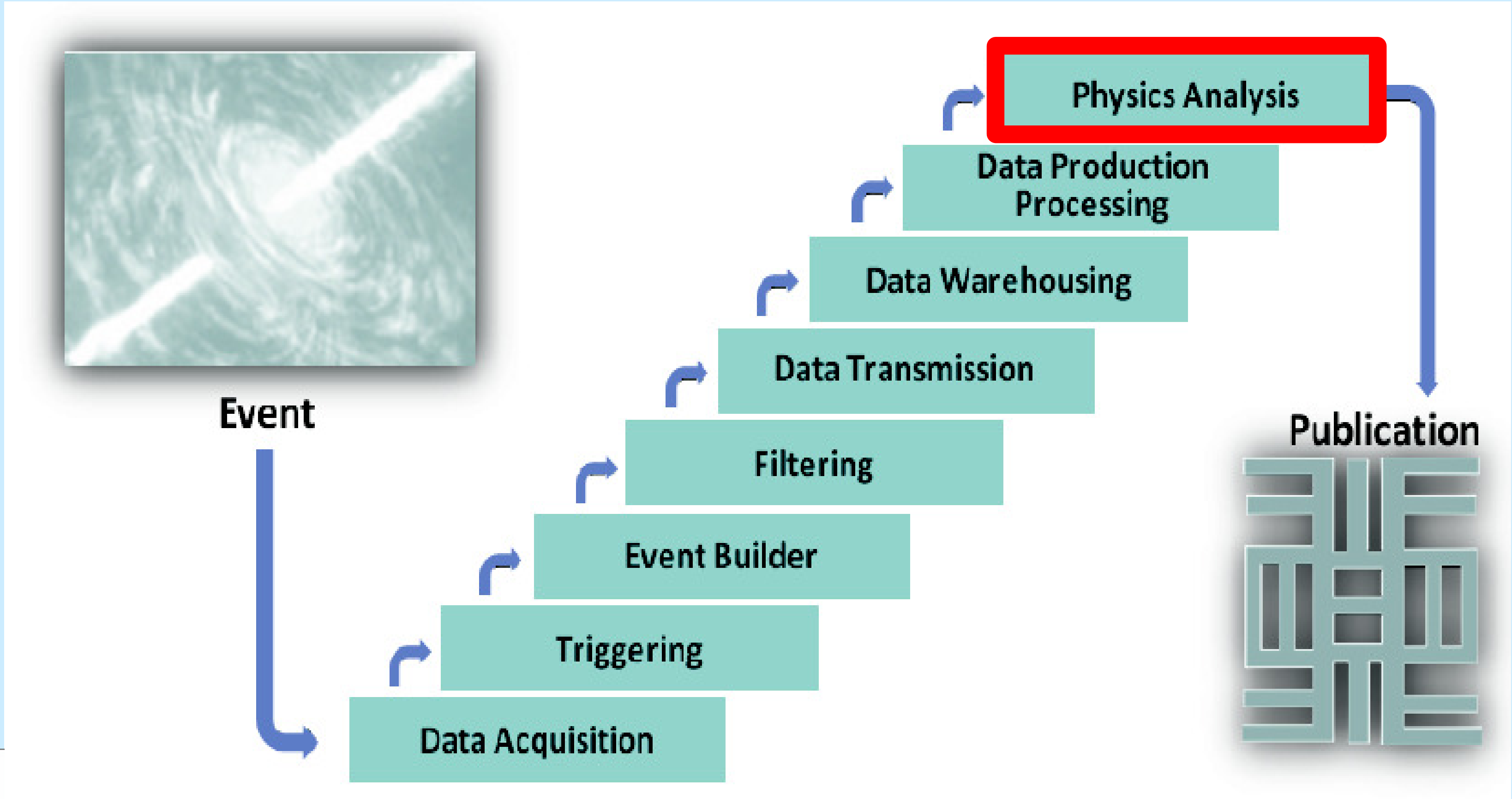
From science event to publication: the last step



Elisa Resconi, MPIK

Physics Run

From April-May to April-May year later

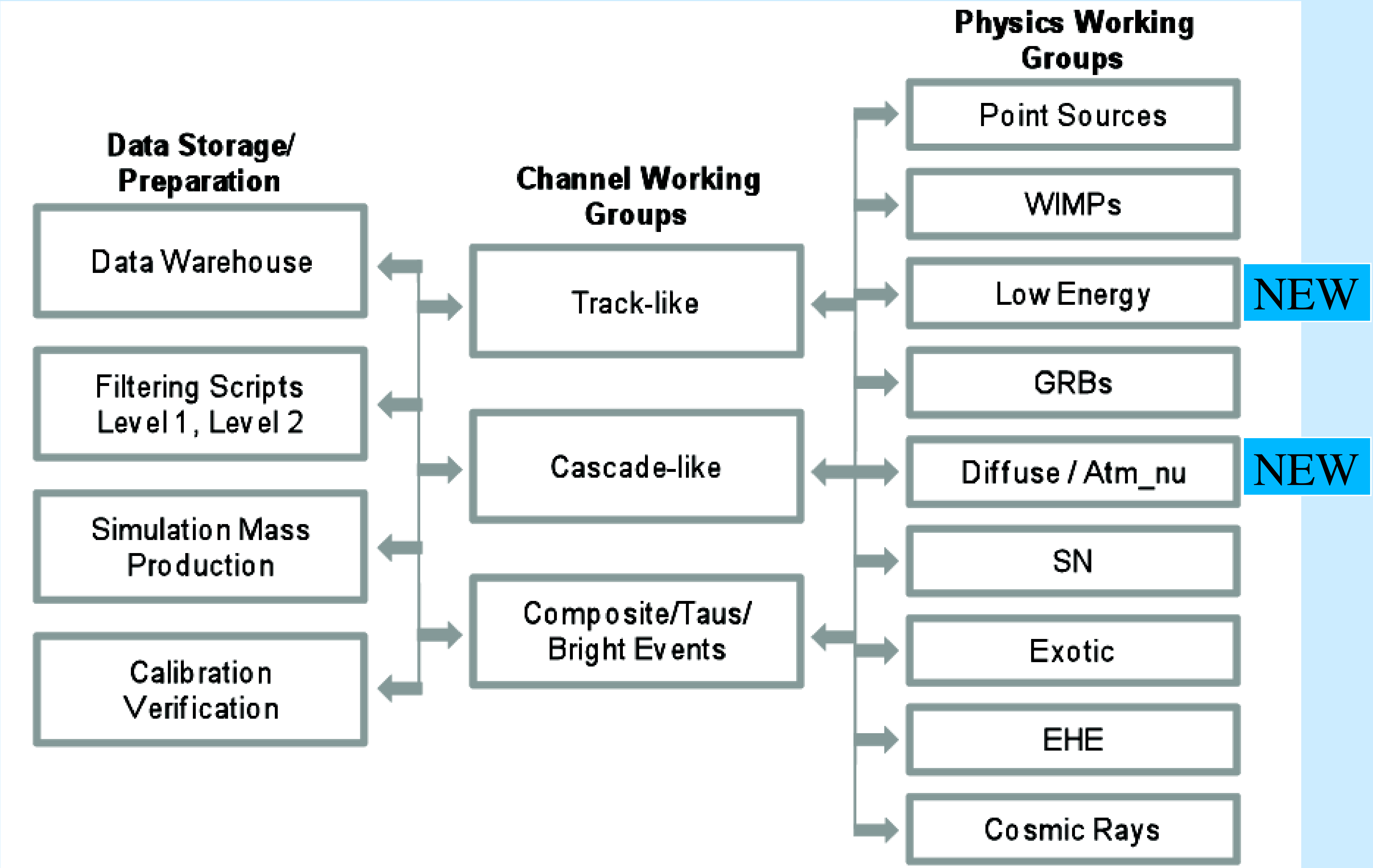
IceCube-9 strings (2006-2007): completed

IceCube-22 strings + AMANDA (2007-2008): completed

IceCube-40 strings + AMANDA (2008-2009): completed

IceCube-59 strings (2009-2010): just started

Distributed Model



Elisa Resconi

Distributed Model

Physics Working Groups

- Point Sources
- WIMPs
- Low Energy
- GRBs
- Diffuse / Atm_nu
- SN
- Exotic
- EHE
- Cosmic Rays

IC22, 3 steady searches,

soft spectra sources optimization

UHE, southern hemisphere optimization

flaring/periodic sources optimization

first paper submitted to ApJL

IC40, unblinding proposals under preparation

IC59, on-line filters submitted, under verification

Distributed Model

Physics Working Groups

- Point Sources
- WIMPs
- Low Energy
- GRBs
- Diffuse / Atm_nu
- SN
- Exotic
- EHE
- Cosmic Rays

IC22, results published PRL

IC40, under preparation

IC59, on-line filters submitted, under verification

Distributed Model

Physics Working Groups

- Point Sources
- WIMPs
- Low Energy
- GRBs
- Diffuse / Atm_nu
- SN
- Exotic
- EHE
- Cosmic Rays

IC22, GRB080319B search, published PRL

Northern GRBs, unblinded

Southern GRBs, unblinded

IC40, GCNs sent by IceCube to ROTSE

unblinding proposals under preparation

IC59, GCNs sent by IceCube to ROTSE (updated)

On-line filters submitted, under verification

Distributed Model

Physics Working Groups

- Point Sources
- WIMPs
- Low Energy
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- EHE
- Cosmic Rays

IC22, 2 analysis unblinded,

excess of events at high nch, in the bottom part of the detector;

Hidden systematic effects under study.

Cascades analysis under discussion.

IC40, unbinned analysis under preparation

IC59, on-line filters submitted,

under verification

Distributed Model

Physics Working Groups

- Point Sources
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- EHE
- Cosmic Rays

SNDAq extended to IceCube in 2007

Distributed Model

Physics Working Groups

- Point Sources
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- EHE
- Cosmic Rays

Simulation of very high energetic events, done IC22, IC40, Tau signature analysis, on going

Distributed Model

Physics Working Groups

- Point Sources
- WIMPs
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- SN
- Exotic
- EHE
- Cosmic Rays

Independent simulation software

IC22, unblinding proposal approved

IC40, under preparation

IC59, on-line filter

Distributed Model

Physics Working Groups

- Point Sources
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- Low Energy
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- SN
- Exotic
- EHE
- Cosmic Rays

IC22, large scale anysotropy

IceTop26, CR energy spectrum

Coincident events for knee composition

… for systematic effects study?

Channel: Muons

Neutrino-induced muon: CC muon neutrino interaction

- Point Source
- Diffuse
- WIMPs
- GRBs

Time resolution: ~2-3 nsec

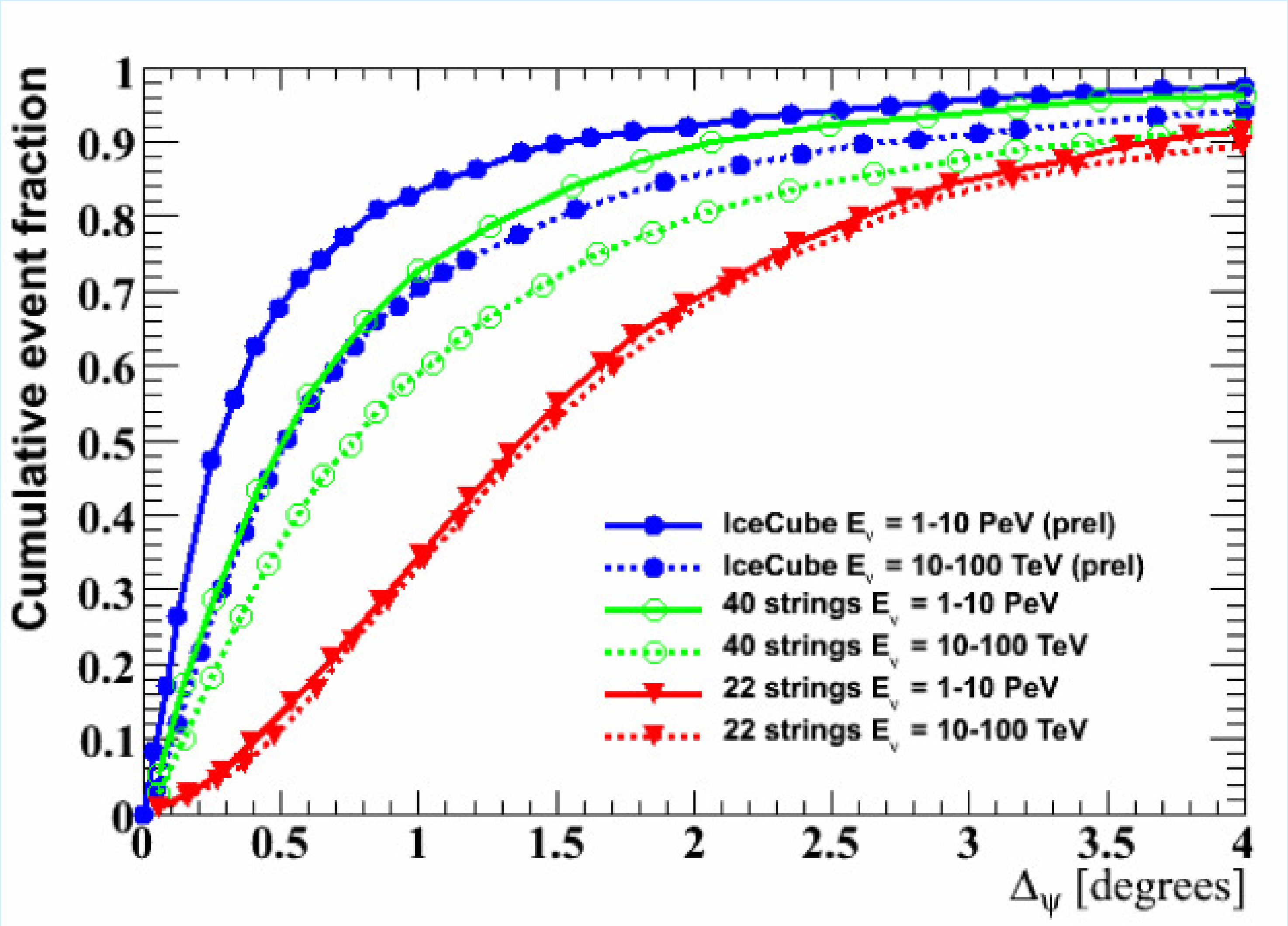
Incoming Direction: log-likelihood based reconstructions (with ice layers, analytic approximations)

Centralized Framework “Gulliver”:

- code reviewed
- set of standard projects
- constantly new implementations under test

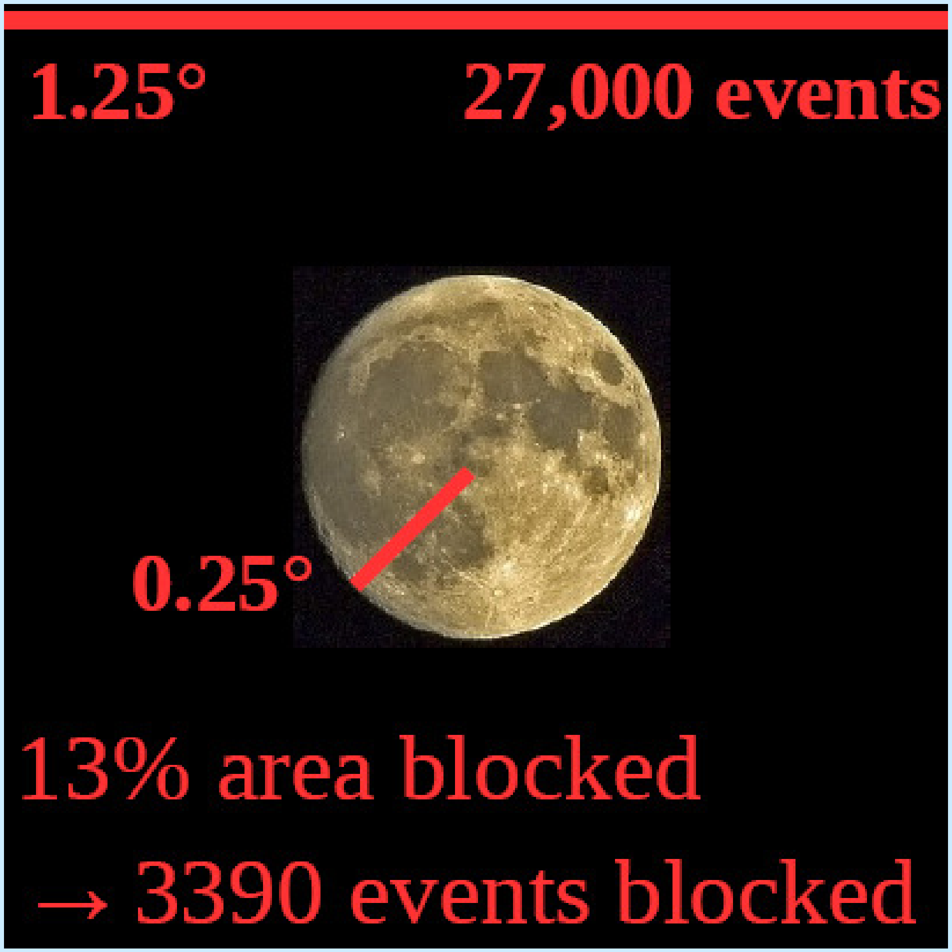
Channel: Muons

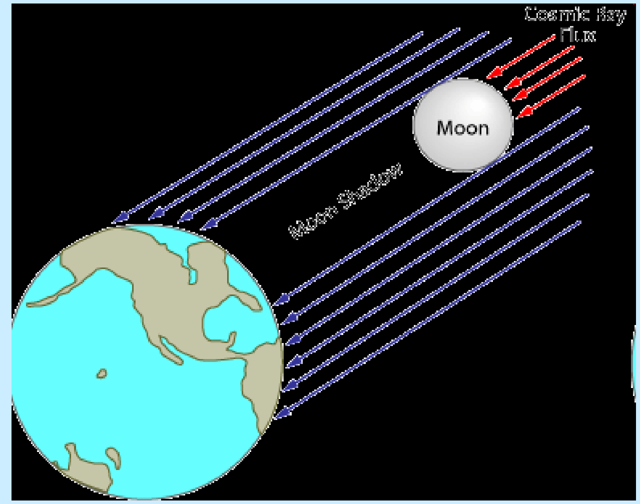
Incoming Direction: point spread function of the 22-, 40-, and 80-string



Channel: Muons

Absolute Pointing: shadow of the moon



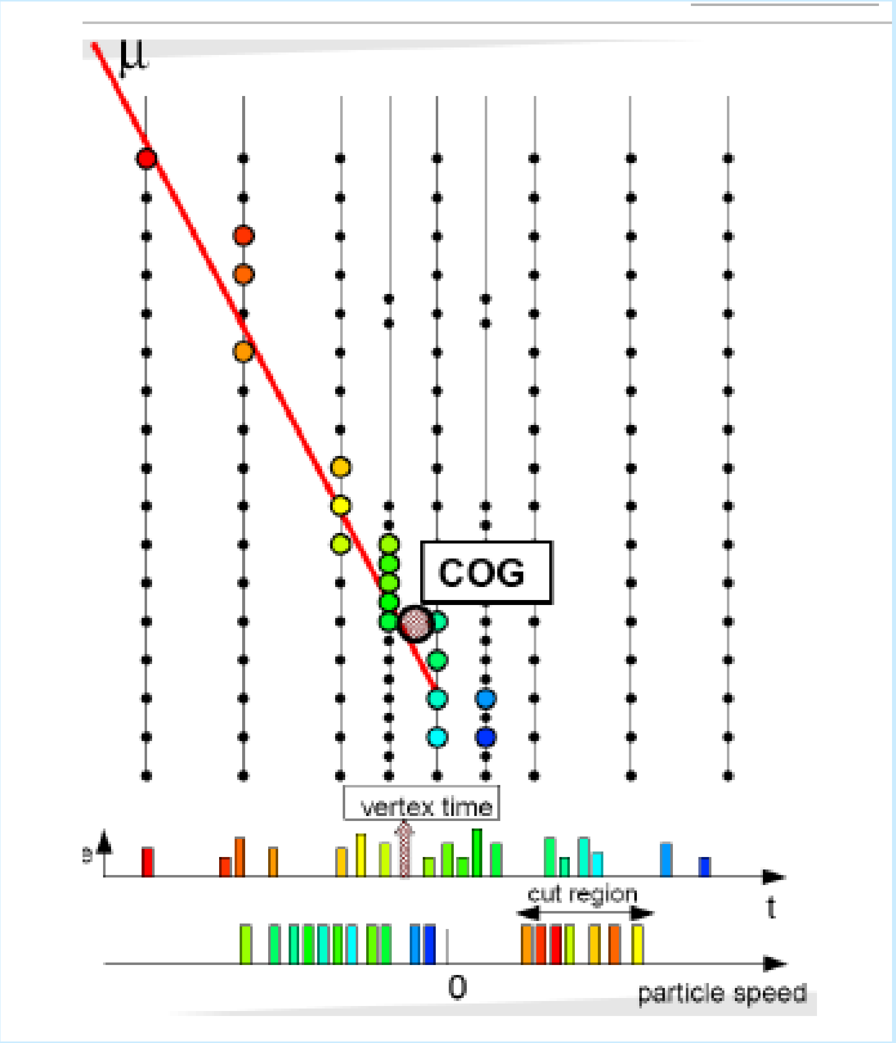


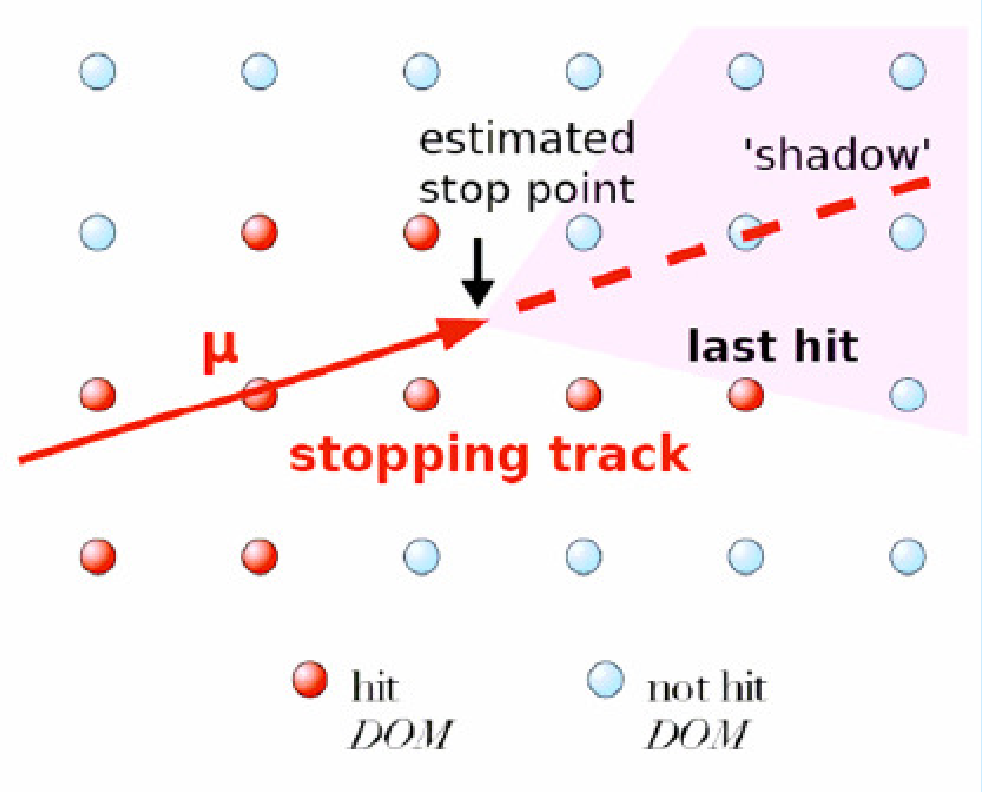
Moon bin shadow: 5.2 σ less events

Channel: Muons

New signatures: starting, stopping, contained events

Veto technique: Deep Core



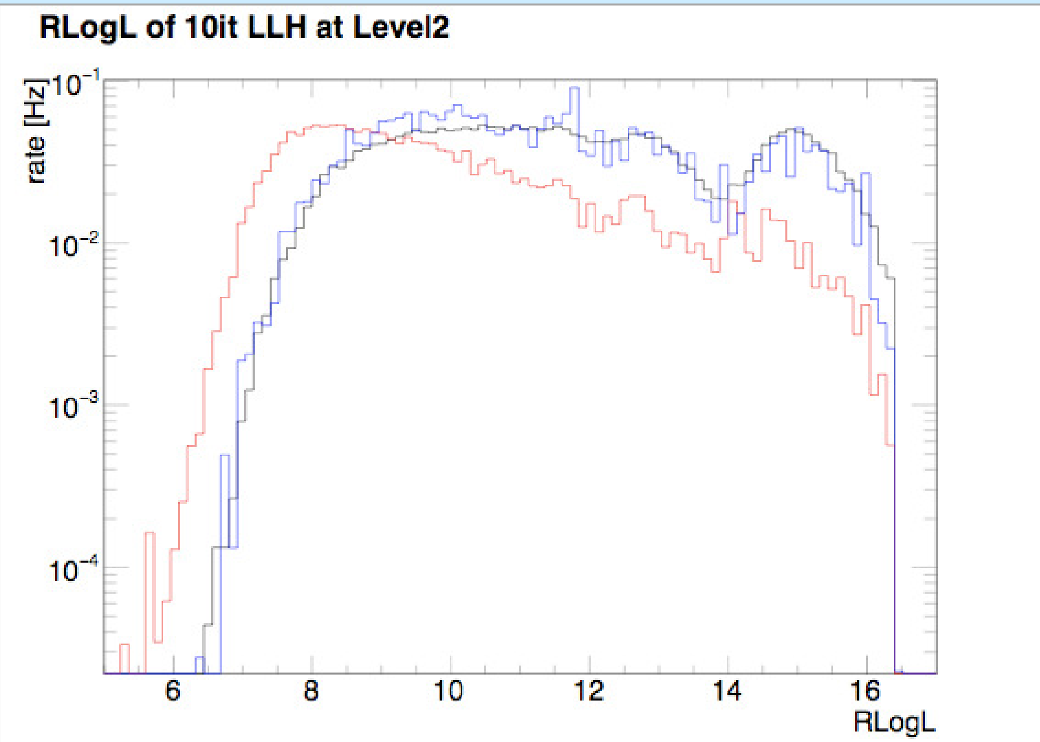


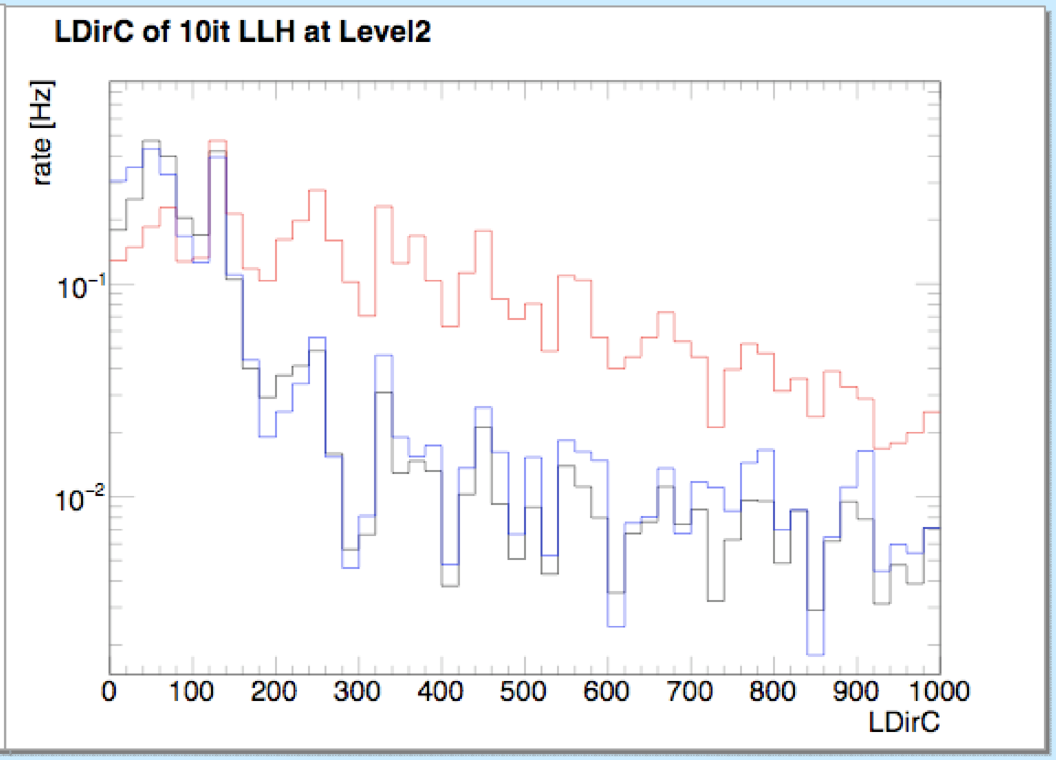
Channel: Muons

RLogL

IceCube 59

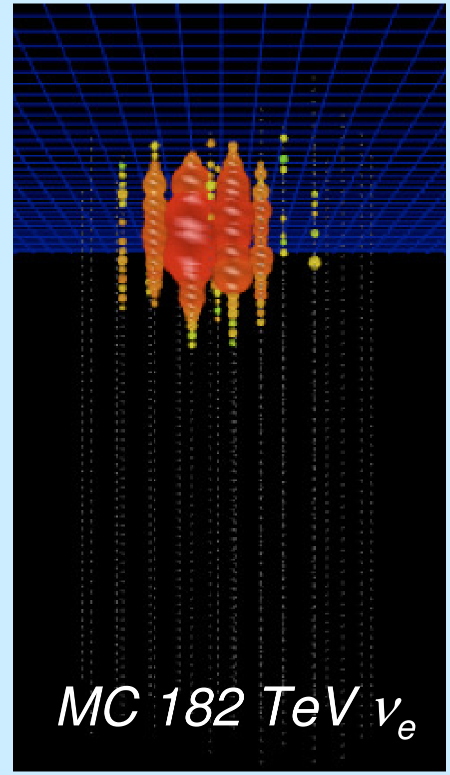
LDirC





Data Quality: constantly monitored

Channel: Cascades



Neutrino-induced cascades:

NC and CC electron neutrino events,

NC muon neutrino events, and **starting events**

- Diffuse, atm nus
- Variable point sources
- GRB

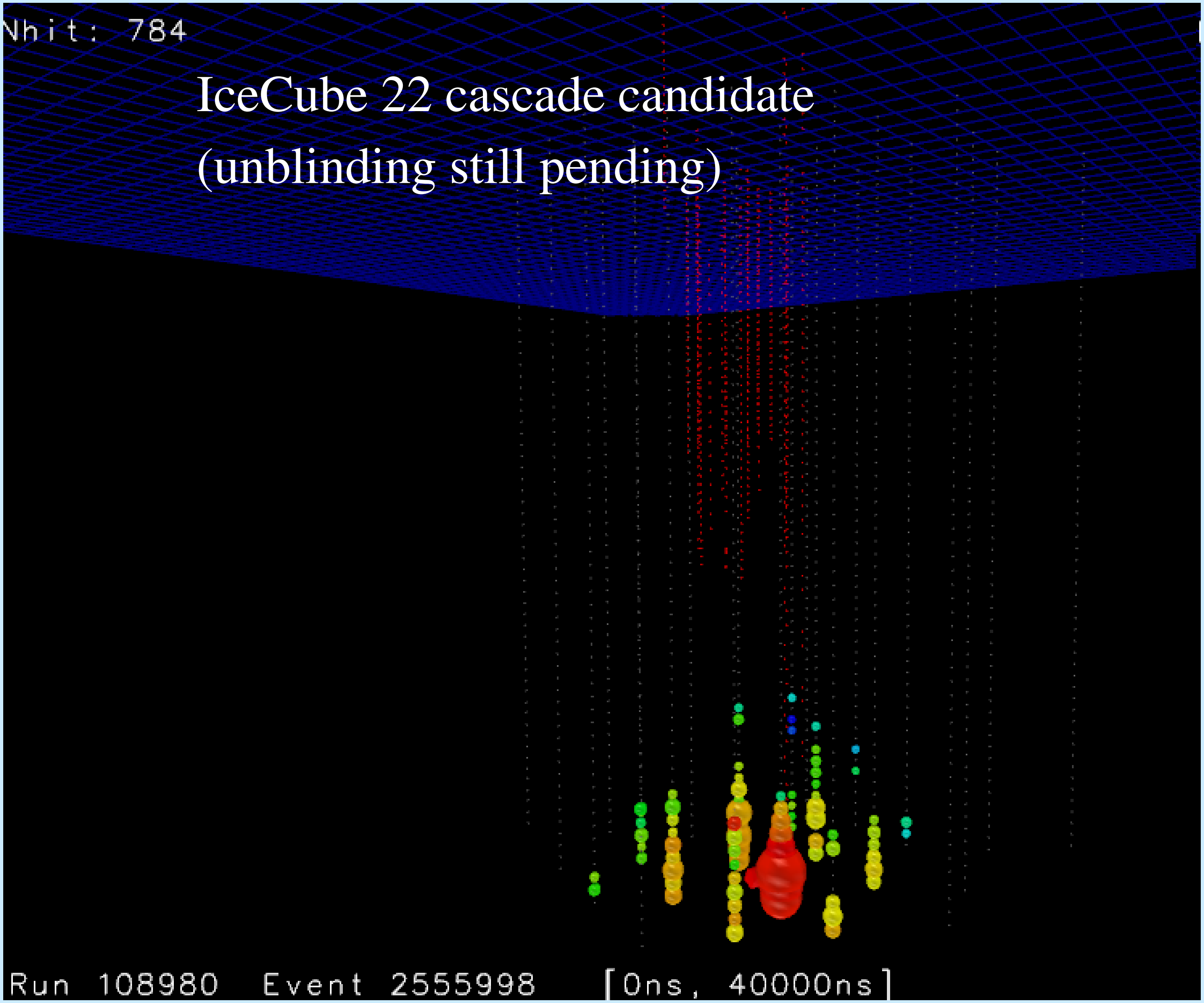
Interaction vertex resolution: $\sigma_x = 7$ m $\sigma_y = 7$ m $\sigma_z = 4$ m

Energy reconstruction (using ice properties): $\sigma(\log_{10}E) = 0.2$ (up to ~10 PeV)

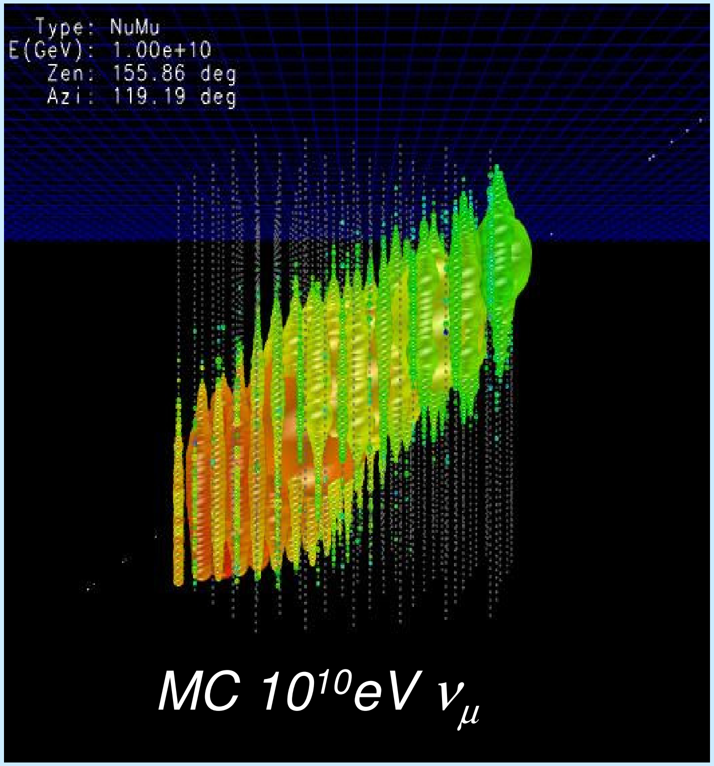
Advances in methods for events identification

IceCube 22: Rate(ν_e) ~ 15 /day

Channel: Cascades



Channel: Composite/ Bright



Analysis Topics:

- Tau: Double Bang events (Learned & Pakvasa 1995)
- EHE /GZK

Reconstruction: double-bang, other signatures under study on MC

Simulation: mass production started

Plans: 4 Tau analysis under going

EHE: IC22 analysis recently unblinded

GZK: new test recently performed (add info from the meeting)

Systematic Effects

- Study of systematic effects in IceCube: permanent activity

- Calibration and verification wg leading

- Problematic issues integrated and discussed at the analysis call

Systematic Effects

1- Natural Materials:

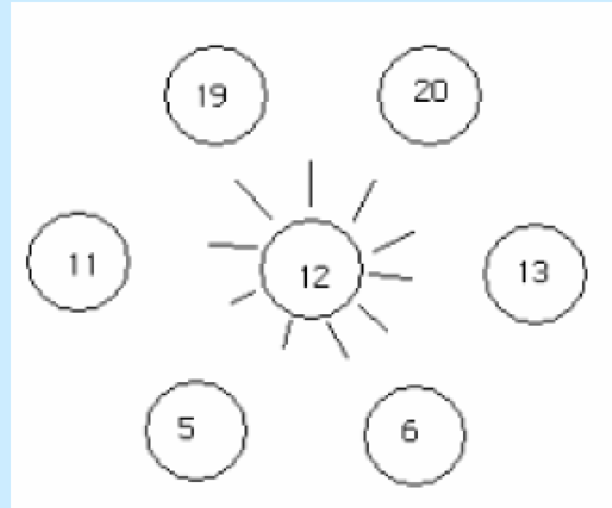
- Atmosphere: correlation of rates in IceCube with long and short term variations in the South Pole atmosphere
- Bulk Ice, Hole Ice

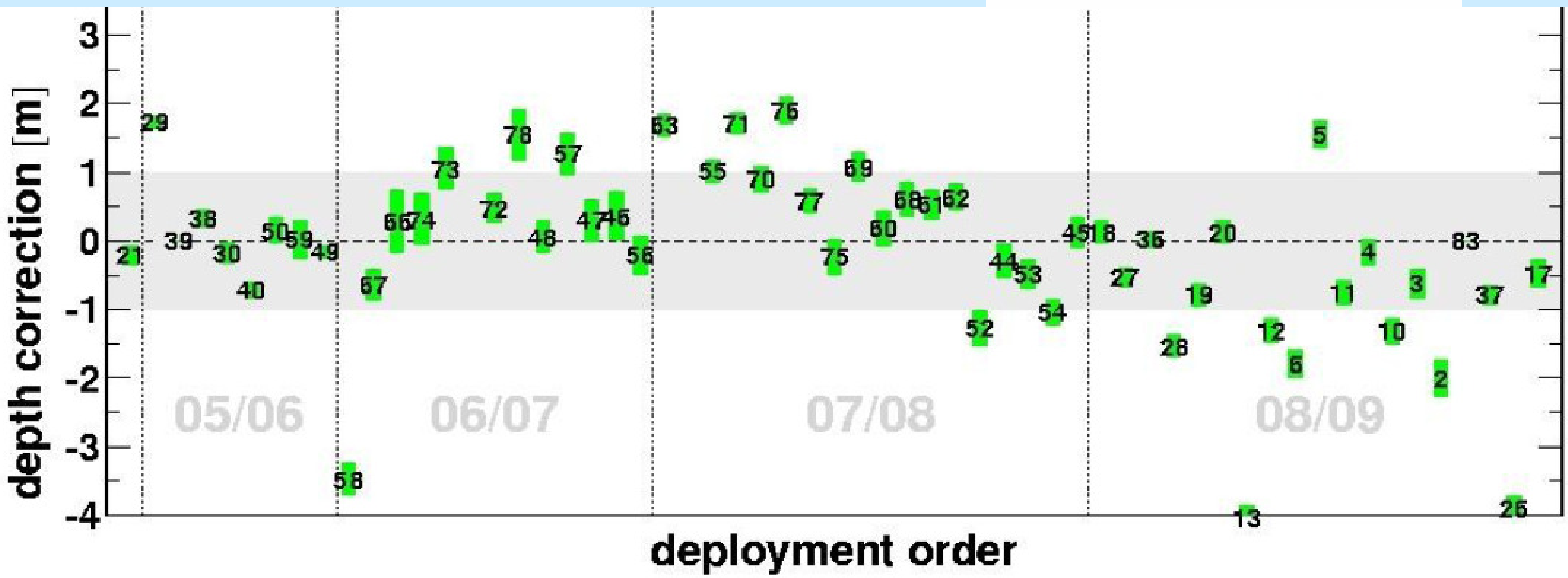
2- Detector:

- DOM Sensitivity: Absolute SPE, Angular sensitivity,
  Wavelength dependence
- Time resolution and timing offsets
- Charge measurement (fADC, ATWD): gain calibration, PMT saturation and linearity.
- Geometry stage-1: from deployment (Survey data, Drill data etc)
- Geometry stage-2: from flasher data

Systematic Effects

Flash 6 DOMs and
read out surrounding strings





Systematic Effects

2- Detector:

- Monitor
- Good Run List, Bad DOM List
-

3- Theoretical Uncertainties:

4- Analysis Methods: introduced biases

- Reconstruction: type of events, direction, energy

Systematic Effects

Tests:

- Stretched Ice: Alexander
- -Stretched DOM sensitivity: …

- To be improved:
- - Integration of systematic checks
- - More checks at lower level, not analysis oriented
- - Introduction of data quality verification
- -….

Procedures

Data Analysis: from the idea to the unblinding approval

-1- Working group discussion, internal referee

-2- Approval from working group

-3- Plenary presentation of the unblinding proposal at the analysis call

-4- Independent referee process

-5- Final approval comes from the entire collaboration

-6- Results

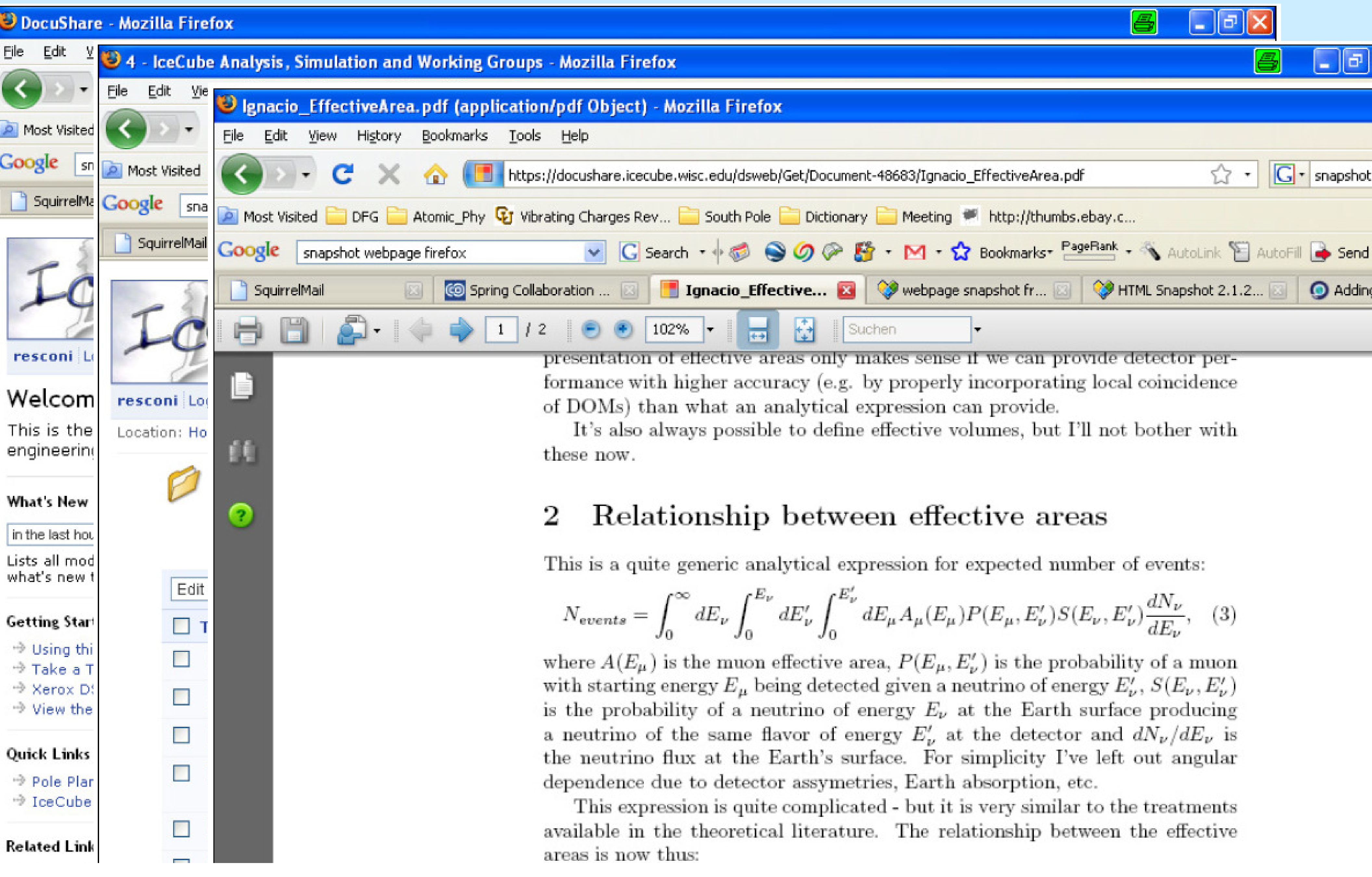
Publication:

-1- First draft circulated to the entire collaboration

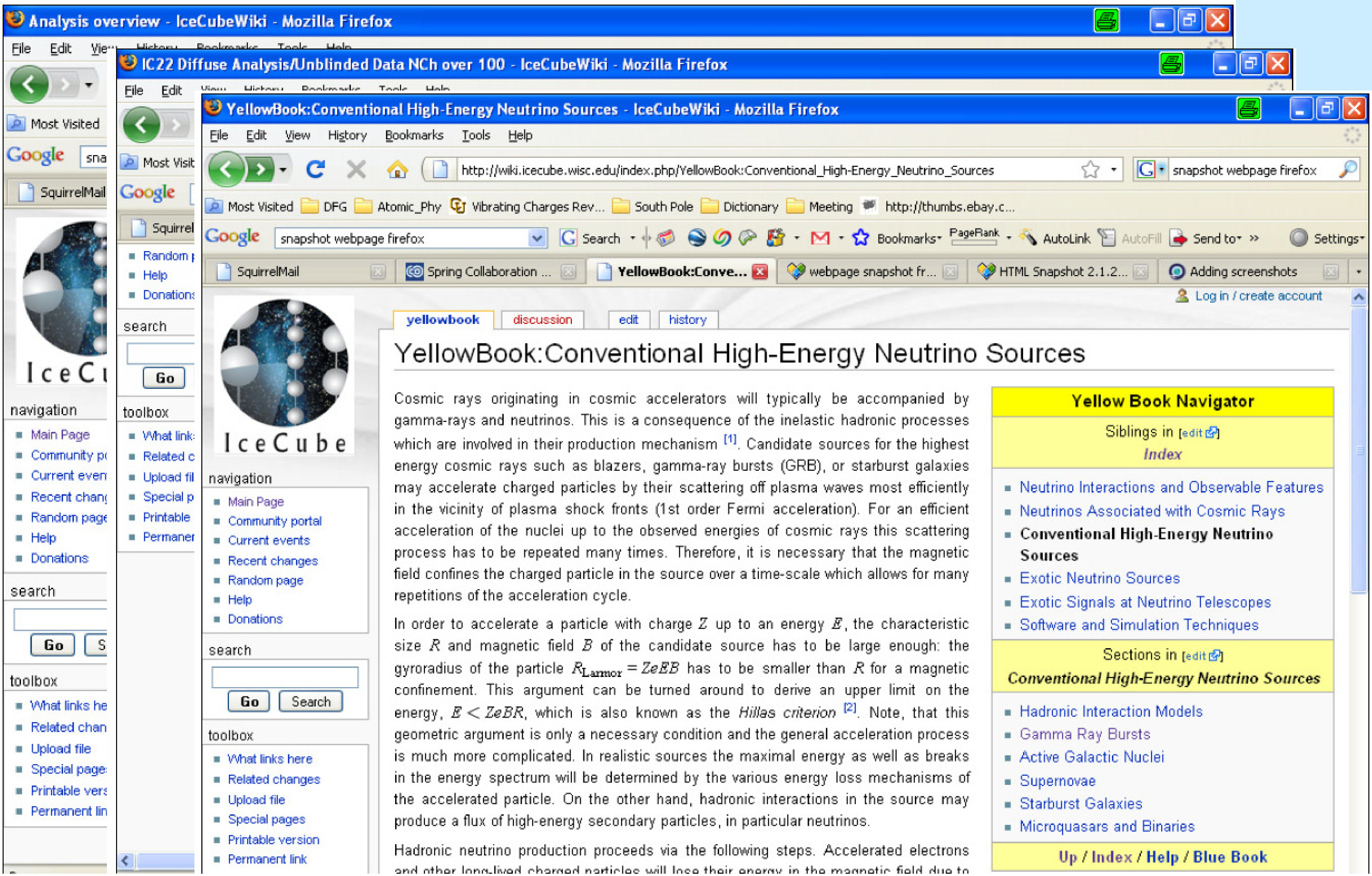
-2- Internal Referee: new draft

-3- New draft to the collaboration

Knowledge Management

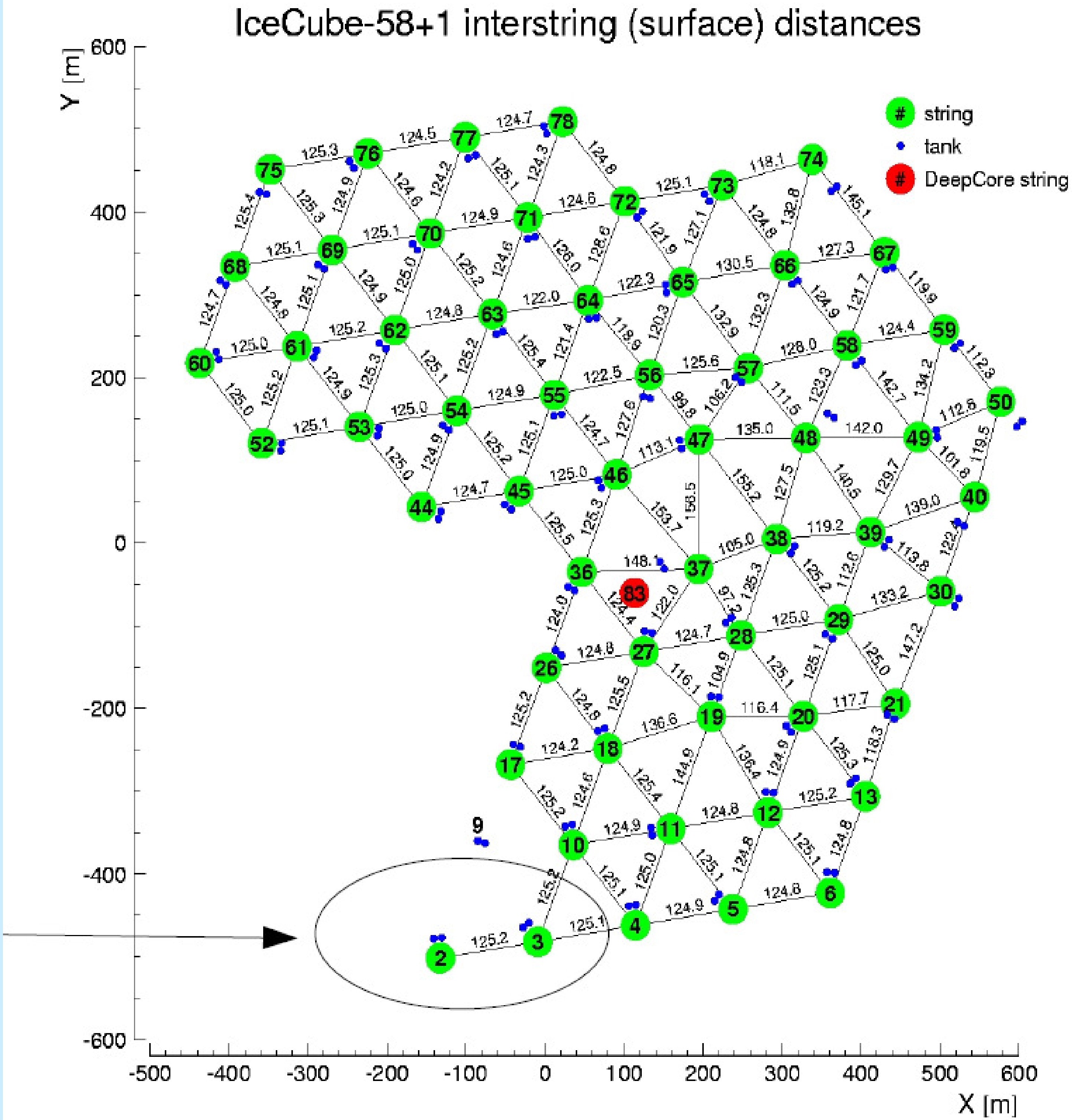


Knowledge Management



Prospects

- Maintain flow of the analysis
- Maintain efforts towards study of systematics effects
- Continue feedback distributed model
- Operate IceCube towards discovery!


IceCube-58+1 interstring (surface) distances
Y [m]
X [m]
string
tank
DeepCore string