

Welcome to ***PolarConnect***

With Katey Shirey and the IceCube
In-Ice Telescope Project

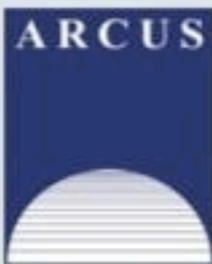
Monday 6 December 2010

8:15 am AKST

(9:15 am PST, 10:15 am MST, 11:15 am CST, 12:15 pm EST)



WELCOME TO WIMBA



ARCTIC RESEARCH CONSORTIUM OF THE UNITED STATES

Raise your hand to ask a question

Slides will be shown here

If using VOIP, press and hold here to talk

Your connection strength

List of all participants

Return to the lobby or exit

'Chat' with one person or the entire group


TALK

Exit - Lobby - Help

You have entered the lobby.

You have entered 'Arctic Research Consortium of the United States (ARCUS)'.

Your media format is WimbaMedia.

You say, "I'm going to change the slide momentarily to show the one I need for my new screen shot"

To: Main Room

People (3)	
Kristin_Timm	
kristina_creek	
Kristin_Timm	

Please note:

- Participant using the telephone can mute/unmute by pressing *6 on the phone.
- Today's event will be recorded and archived.

Roll Call

When called, please state your:

- ✓ Name
- ✓ School / Institution
- ✓ The number of students and adults participating with you in the same location

What is PolarTREC?

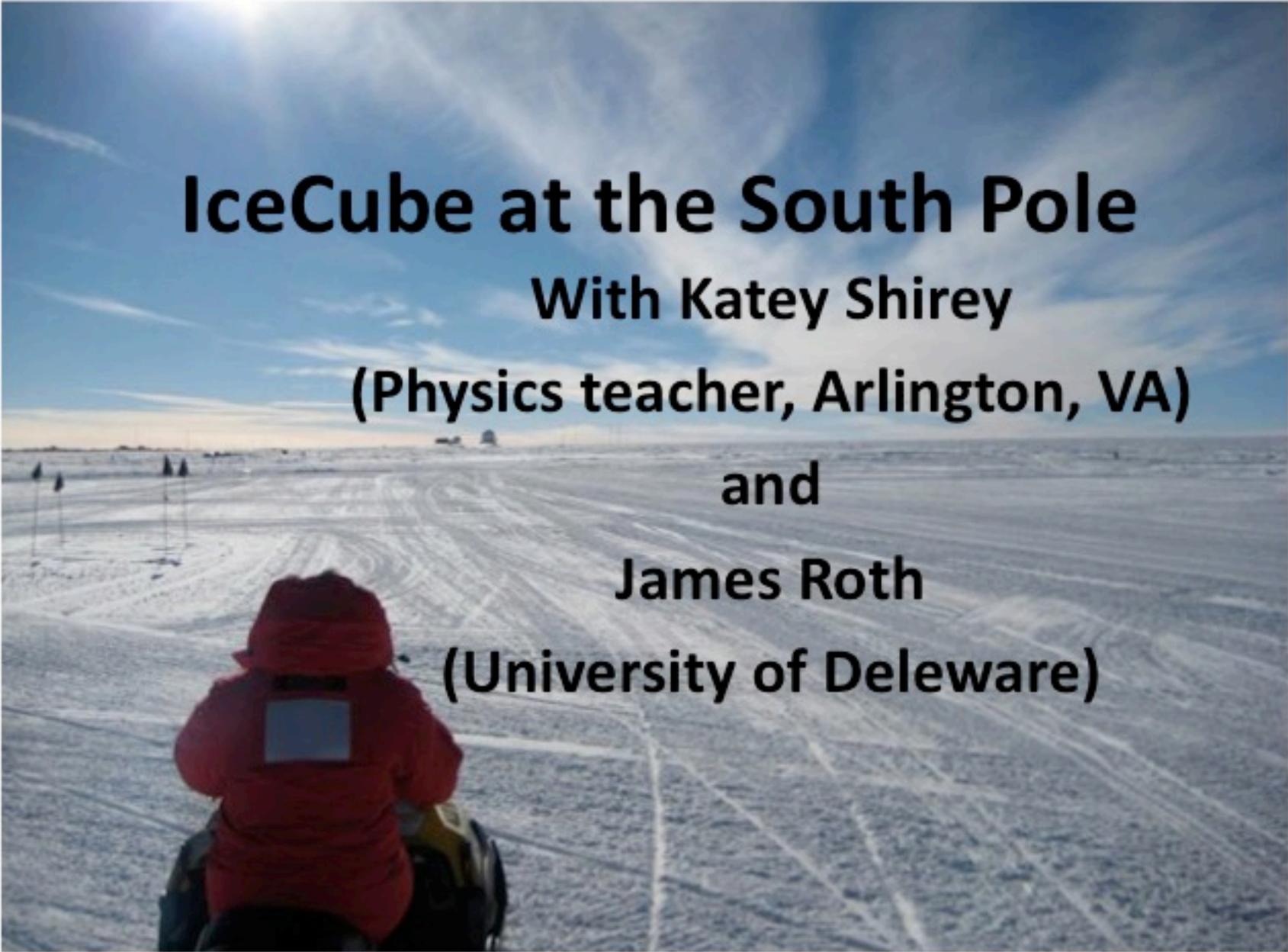
PolarTREC is a professional development experience in which K-12 teachers are paired with researchers for 2-6 week research experiences in the polar regions.

From 2010-2013, nearly 50 teachers from around the United States will join scientists in the Arctic and Antarctica to learn about science, the polar regions, and to share what they have learned with their students and communities.

Questions

To Ask a Question:

- ✓ Raise your hand with the “hand button”
- ✓ Type your question in the text chat box
- ✓ Speak loud and clear and directly into the phone to ask your question.

A person wearing a red jacket is seen from behind, sitting on a sled or similar transport on a vast, flat, snow-covered landscape. The ground is marked with numerous tracks and lines, suggesting a path or survey area. In the distance, several tall, thin poles or structures are visible against a clear blue sky with a bright sun in the upper left corner. The overall scene is a high-altitude, snowy environment, likely the South Pole.

IceCube at the South Pole

With Katey Shirey

(Physics teacher, Arlington, VA)

and

James Roth

(University of Delaware)

Today on the call:



Katey Shirey
Physics Teacher
Washington-Lee High School
Arlington, VA



James Roth
Senior Electronics Instrument
Specialist
University of Delaware

IceCube studies neutrinos

- **Neutrinos are elementary particles that:**

- often travel close to the speed of light
- lack an electric charge
- are able to pass through ordinary matter so they are extremely difficult to detect

The symbol for a neutrino is nu:

ν

- **Neutrinos can tell us about:**

- nuclear fusion,
- nuclear reactions,
- gamma ray bursts,
- supernovae,
- black holes and
- maybe even the Big Bang.

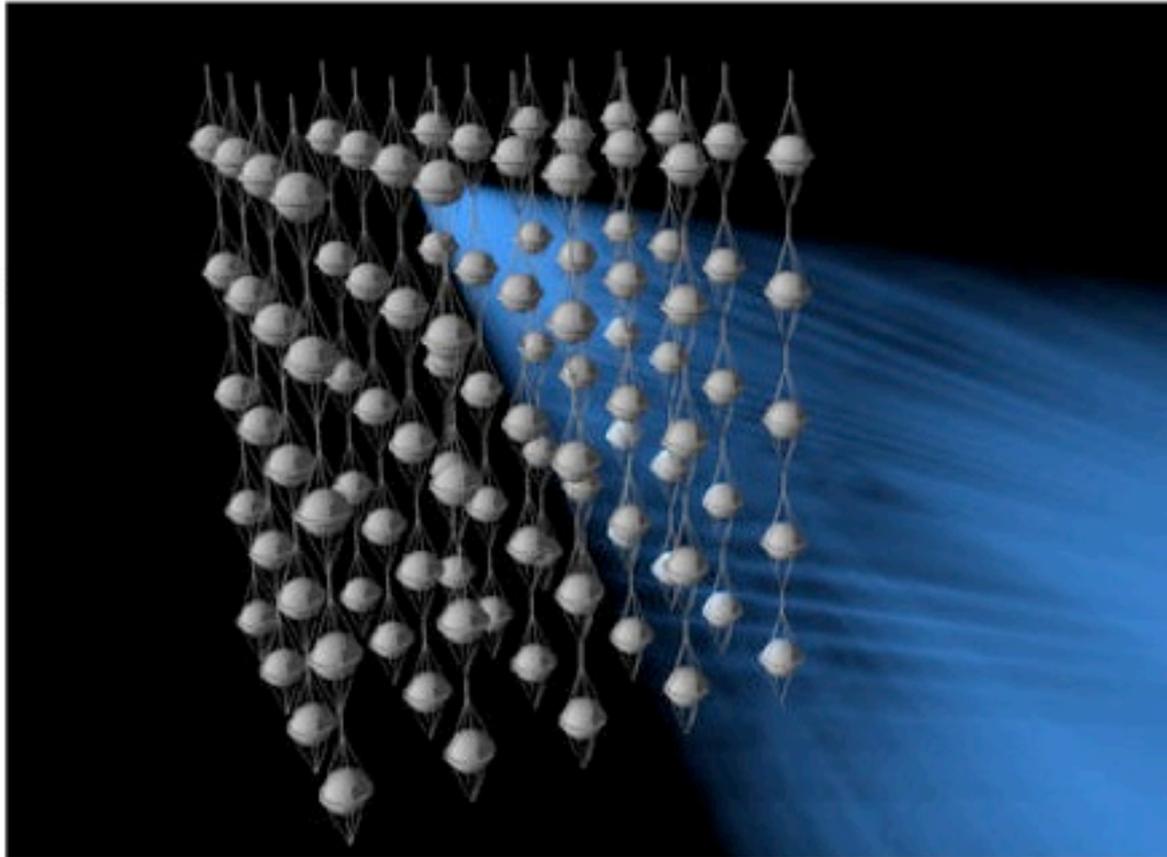


Hubble telescope shows a supernova techimo.com

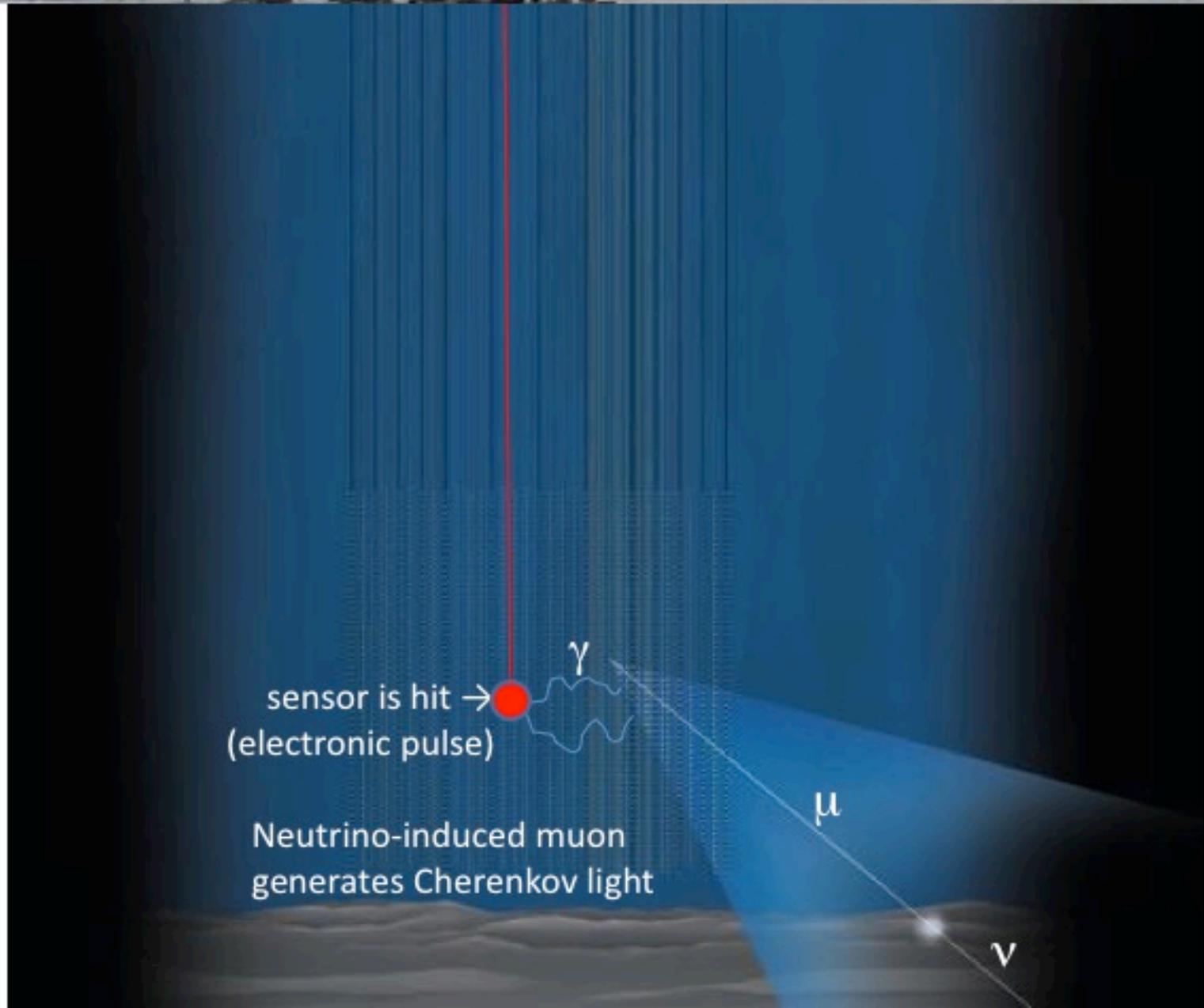
IceCube Neutrino Detector Overview

IceCube is a 3D array of photocollectors buried 1.5 km below the surface of the Antarctic glacier at the geographic South Pole.

The detectors are triggered by light from a muon (μ) moving at super high speeds after a neutrino (ν) collides with a quark in an atom.



Drawing courtesy of IceCube



Drawing courtesy of IceCube¹⁰

IceCube 2007-2008:
18

IceTop

Air shower detector
threshold ~ 300 TeV

1450m

InIce

80 Strings ,
60 Optical Modules
17 m between Modules
125 m between Strings

2450m

2006-2007:
13 Strings

total of
40 Strings
80 IceTop tank

2005-2006: 8 Strings

2004-2005 : 1 String

AMANDA
(1995-2000)
19 Strings
677 Modules

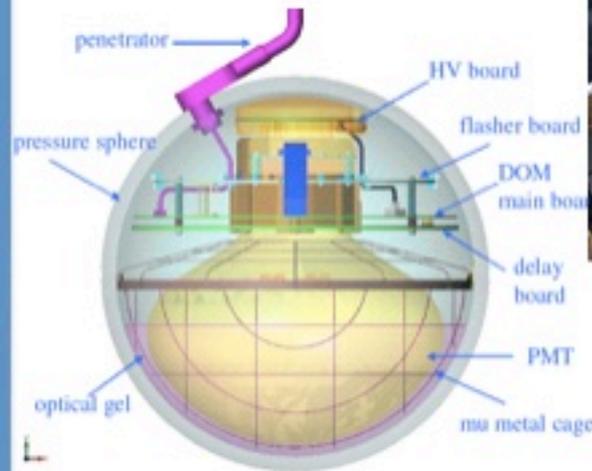


324 m

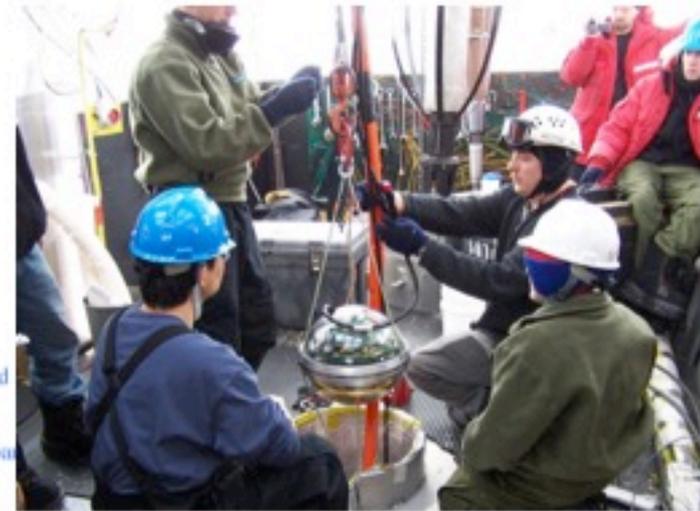
IceCube

1 km³ of ice instrumented
at the geographic South Pole
80 strings/4800 optical sensors

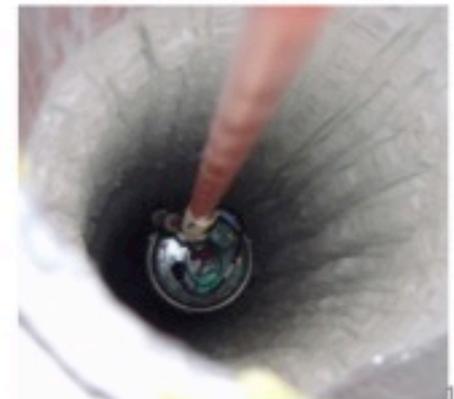
A hot water drill makes
holes down to 2.5 km
(1.6 mi)



A Digital Optical
Module (DOM)



DOM deployment



How does IceTop fit in?



IceTop detects muons moving through tanks of water on the surface of the South Pole.

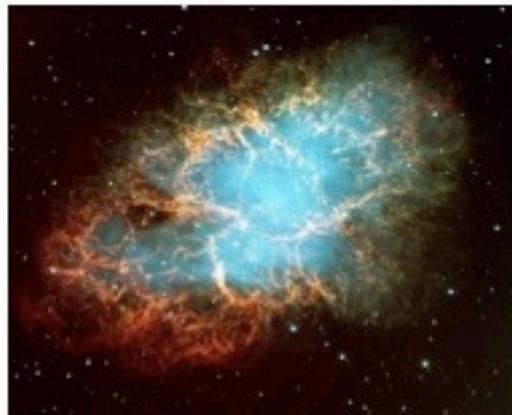
IceTop is interested in muons from cosmic ray showers and other low energy sources.

For every IceCube hole there are four IceTop DOMs.

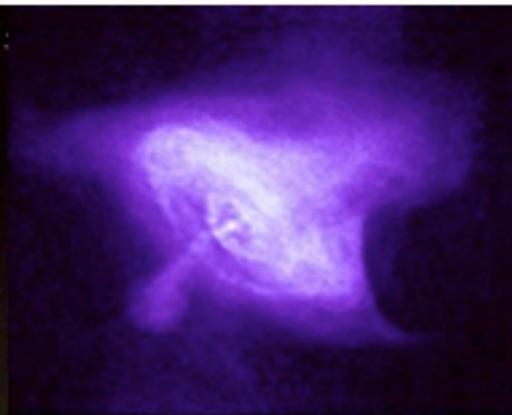
What can we learn from this?

- Neutrinos can be considered an alternate messenger particle to photons

Visible spectrum



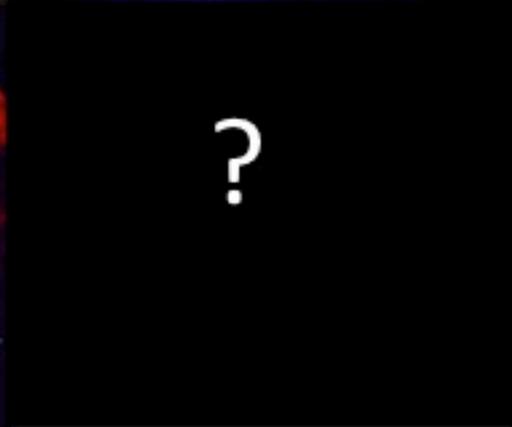
X-Ray spectrum



Infrared spectrum



Neutrinos



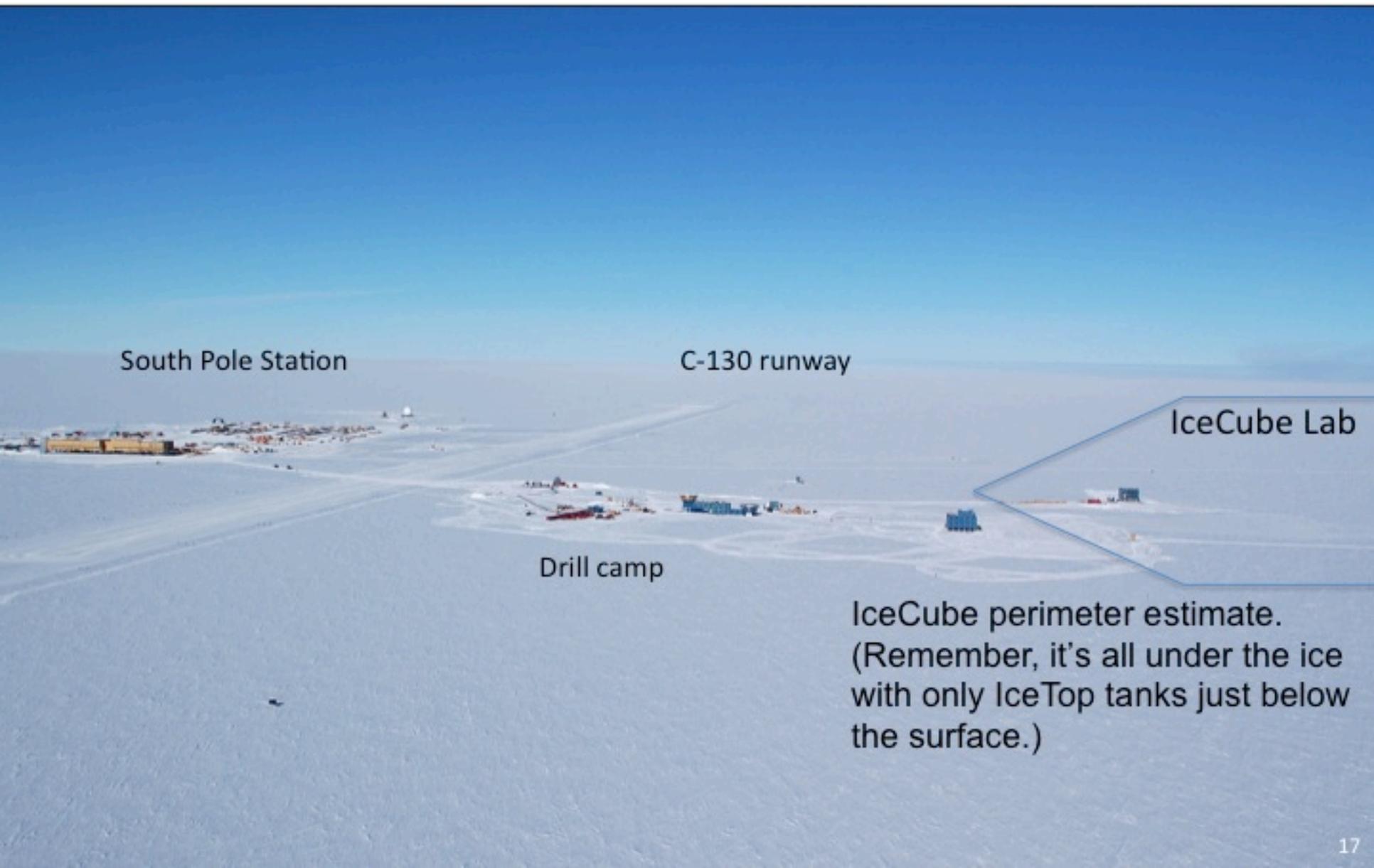
My trip



I flew in two big planes,
with some interesting cargo



Amundsen-Scott South Pole Research Station



South Pole Station

C-130 runway

IceCube Lab

Drill camp

IceCube perimeter estimate.
(Remember, it's all under the ice
with only IceTop tanks just below
the surface.)

South Pole Station (US)



WEATHER FACTS

Average annual temperature

-49.5° C (-57.1° F)

Average summer temperature (now)

-37.2° C (-35° F)

RECORD LOW

82.8° C (-117.0° F)
in June 1982

RECORD HIGH

-13.6° C (+7.5° F) in
December 1978

AIR PRESSURE NOW

~670 mb, that's equivalent
to the pressure at 10,689
ft! (actual elevation, 9,300
ft.)



Day: October-March
Night: April-September

Drill camp for IceCube



Photo Credit: Jim Haugen

IceTop's goals for 2010-2011;

16 tanks prepped, placed, filled, frozen and finished.



IceTop tanks
In the tank farm



Placing a tank in a trench.

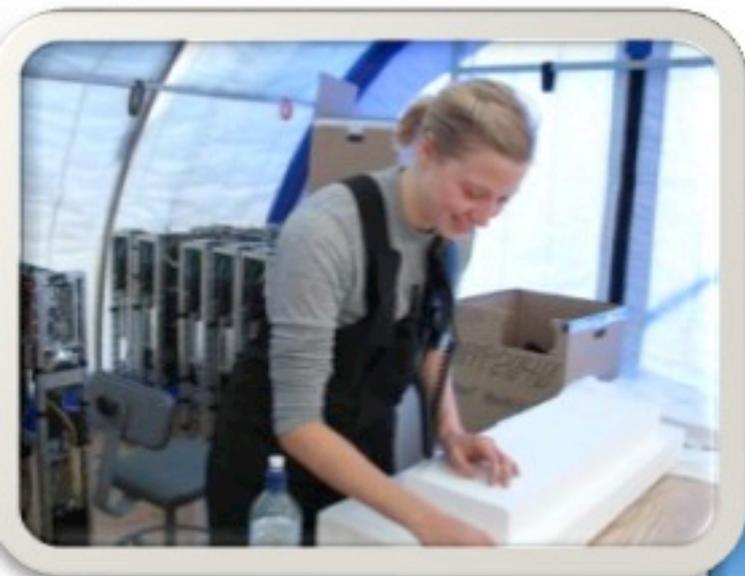


Final tank clean out means getting in the tank!



DOMs freezing after the fill.

Lining tank doors with fleece



Wiring surface junction boxes.



Mounting DOMS for hanging.



Pulling surface cables.

My Jobs



Installing freeze control units 21

Thanksgiving at the South Pole



South Pole Ice Tunnels



More online!

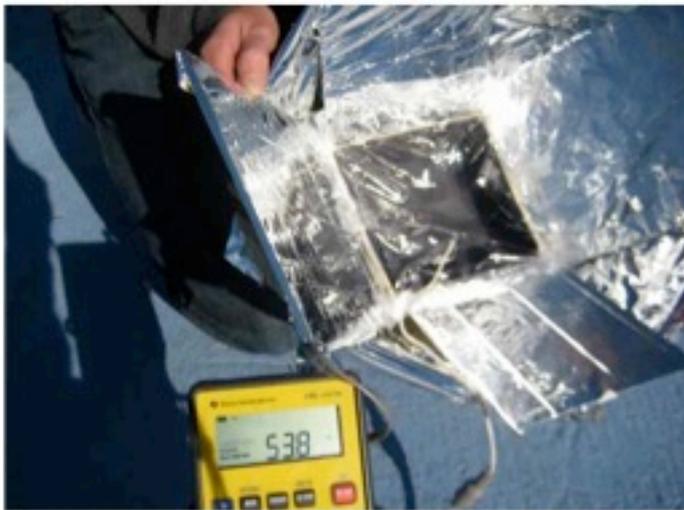
<http://polartrec.com/expeditions/icecube-in-ice-antarctic-telescope-2010>



Blood oxygen saturation interview and results



Totally wacky Polies



Will the solar ovens ever arrive?



Vehicles to move you

Thanks for coming,
do you have any
questions?





TEACHERS AND RESEARCHERS
EXPLORING AND COLLABORATING

Upcoming Events

Watch for and register for upcoming events at www.polartrac.com!

PolarConnect Event with Tina Sander and the [Antarctic Seafloor Ecology Expedition](#)

DATE: Friday, 3 December 2010 **TIME:** 9:00 AM AST (10:00 AM PST, 11:00 AM MST, 12:00 PM CST, 1:00 PM EST)

PolarConnect Event with Katey Shirey and the [IceCube: In-ice Antarctic Telescope 2010 Expedition](#)

DATE: Monday, 6 December 2010 **TIME:** 8:15-9:45 AM AST (9:15 AM PST, 10:15 AM MST, 11:15 PM CST, 12:15 PM EST)

Note: This event will be 1.5 hours and consist of presentations alternating with question and answer sessions. Classes may come and go during event.

PolarConnect Event with Lesley Urasky and the [Glacial History in Antarctica Expedition](#)

DATE: Tuesday, 14 December 2010 **TIME:** 5:00 PM AST (6:00 PM PST, 7:00 PM MST, 8:00 PM CST, 9:00 PM EST)

PolarConnect Event with Lesley Urasky and the [Glacial History in Antarctica Expedition](#)

DATE: Thursday, 6 January 2011 **TIME:** 12:00 noon AST (1:00 PM PST, 2:00 PM MST, 3:00 PM CST, 4:00 PM EST)

Thank You!

An archive of the event will be available shortly.

<http://www.polar-trec.com/polar-connect/archive>

