AS THE POLAR SUNSET BEGINS, ROSIE AND GIBBS ARE EXCITED TO LEARN ABOUT THE VERY FIRST EXTENSION OF THE ICECUBE NEUTRINO OBSERVATORY, CALLED THE ICECUBE UPGRADE. WITH A NEW AWARD FROM THE NATIONAL SCIENCE FOUNDATION, AND CONTRIBUTIONS FROM INTERNATIONAL PARTNERS IN GERMANY AND JAPAN, ICECUBE WILL BECOME AN EVEN MORE PRECISE DETECTOR THAN BEFORE!

CAN YOU BELIEVE IN 2022 THEY WILL BE DRILLING RIGHT HERE BELOW OUR FEET!? I WOULD LOVE TO BE HERE WHEN THEY BUILD THE ICECUBE UPGRADE.

ICECUBE
DEEPCORE
ICECUBE UPGRADE

THAT'S FOUR WHOLE YEARS AWAY! CAN'T WE START TODAY?

IT MAY SEEM LIKE A LONG TIME, BUT THERE IS SO MUCH TO DO. WE NEED NEW SENSORS AND A NEW DRILL, TOO.

SO WHY ADD MORE STRINGS TO THE MIDDLE OF THE DETECTOR? ISN'T BIGGER BETTER?

AND TO FIND LOWER ENERGY NEUTRINOS, A DENSER DETECTOR ARRAY IS BETTER?

BIGGER IS FOR EXTRAGALACTIC NEUTRINOS. BUT TO STUDY NEUTRINOS, WE NEED LOWER ENERGY.

YOU GOT IT!

IceCube Upgrade

New Hot Water Drill

ROSIE, PUT ON OUR SPECIAL GOGGLES. I WANT TO SHOW YOU WHAT I LEARNED!

SURE! I'M REALLY CURIOUS HOW THE ICECUBE UPGRADE WILL LOOK.

YOU CAN SEE THE NEW STRINGS IN GREEN. THEY ARE CLOSER TOGETHER TO DETECT LOWER ENERGY NEUTRINOS.

AH, SO THE PLAN NOW IS TO STUDY NEUTRINOS MUCH BETTER AND NOT JUST THE UNIVERSE!

Low-Energy Neutrinos

ZOOM YOUR GOGGLES IN. THE GREEN SENSORS ARE THE NEW DESIGNS.

I'VE SEEN THESE BEFORE. THEY'RE PRODUCED IN SEPARATE LABS. BOTH ARE TESTING NEW TECHNOLOGY WITH THE LARGER ICECUBE-GEN2 IN MIND.

IceCube Sensors

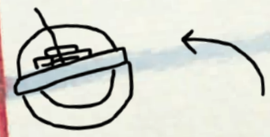
Rosie's Discoveries

IceCube Upgrade
This IceCube extension will deploy 7 new strings in the middle of the current array and will have a total of 760 new sensors. Strings will go even deeper than before, down to 2600 meters. And the plan is to drill the 7 holes in one season. There's a second extension of IceCube planned, called IceCube-Gen 2. This one is to build a 10-times-larger detector and to look for very high energy neutrinos from outer space. I'm amazed, but if there's a team that can build it, it's the IceCubers.

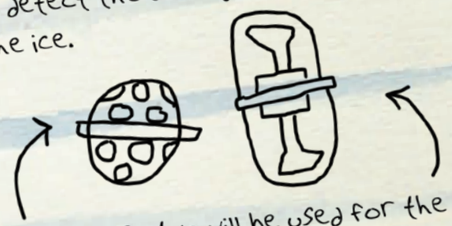
New hot water drill
The drill is the most critical piece of equipment for this new project. It will use near boiling water to efficiently make holes in which to put the new sensors.

Low-energy neutrinos
What IceCube calls low-energy neutrinos are in fact high-energy for other detectors. These are neutrinos created in Earth's atmosphere that can be used to study the properties of neutrinos themselves.

IceCube sensors
These are all light sensors that can detect the blue light produced by neutrino and other particle interactions in the ice.



This is the one used in the current Icecube.



These two will be used for the first time in the IceCube Upgrade. They will be produced in Germany and Japan.

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icecube.wisc.edu

IceCube South Pole Neutrino Observatory

ADVENTURES WITH ROSIE & GIBBS
the lost penguins

IceCube

ADVENTURE 6: NEW EXCITEMENT ON THE HORIZON

MAY 2019