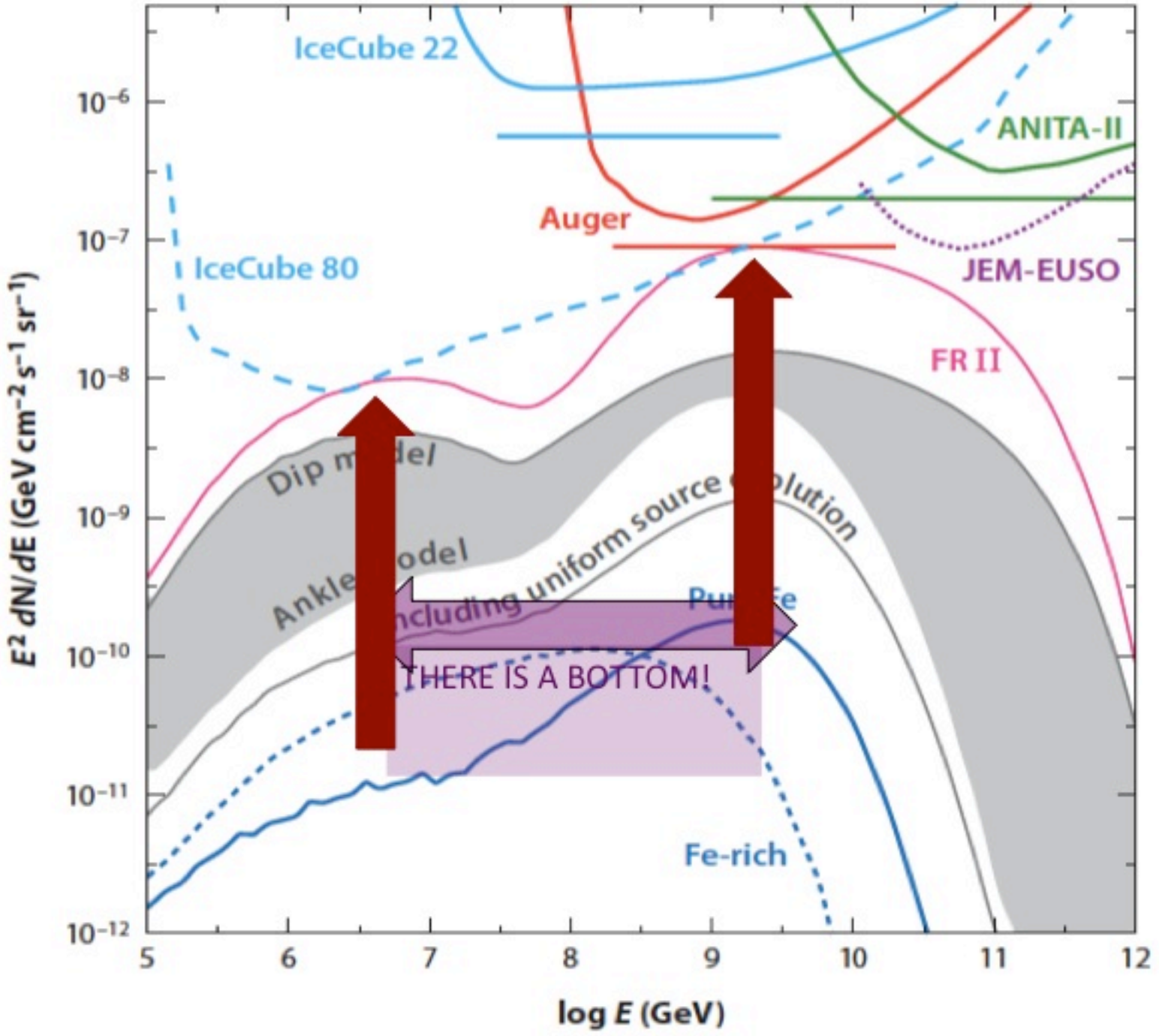
CF-36

What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

The prospects are very good (modulus funding) since:

There is a bottom to the range of GZK fluxes


IceCube 22
ANITA-II
Auger
IceCube 80
JEM-EUSO
FR II
Dip model
Ankle model
including uniform source evolution
Pure Fe
THERE IS A BOTTOM!
Fe-rich
$E^2\,dN/dE$ (GeV cm^{-2} s^{-1} sr^{-1})
log E (GeV)
10^{-6}
10^{-7}
10^{-8}
10^{-9}
10^{-10}
10^{-11}
10^{-12}
5
6
7
8
9
10
11
12

CF-36

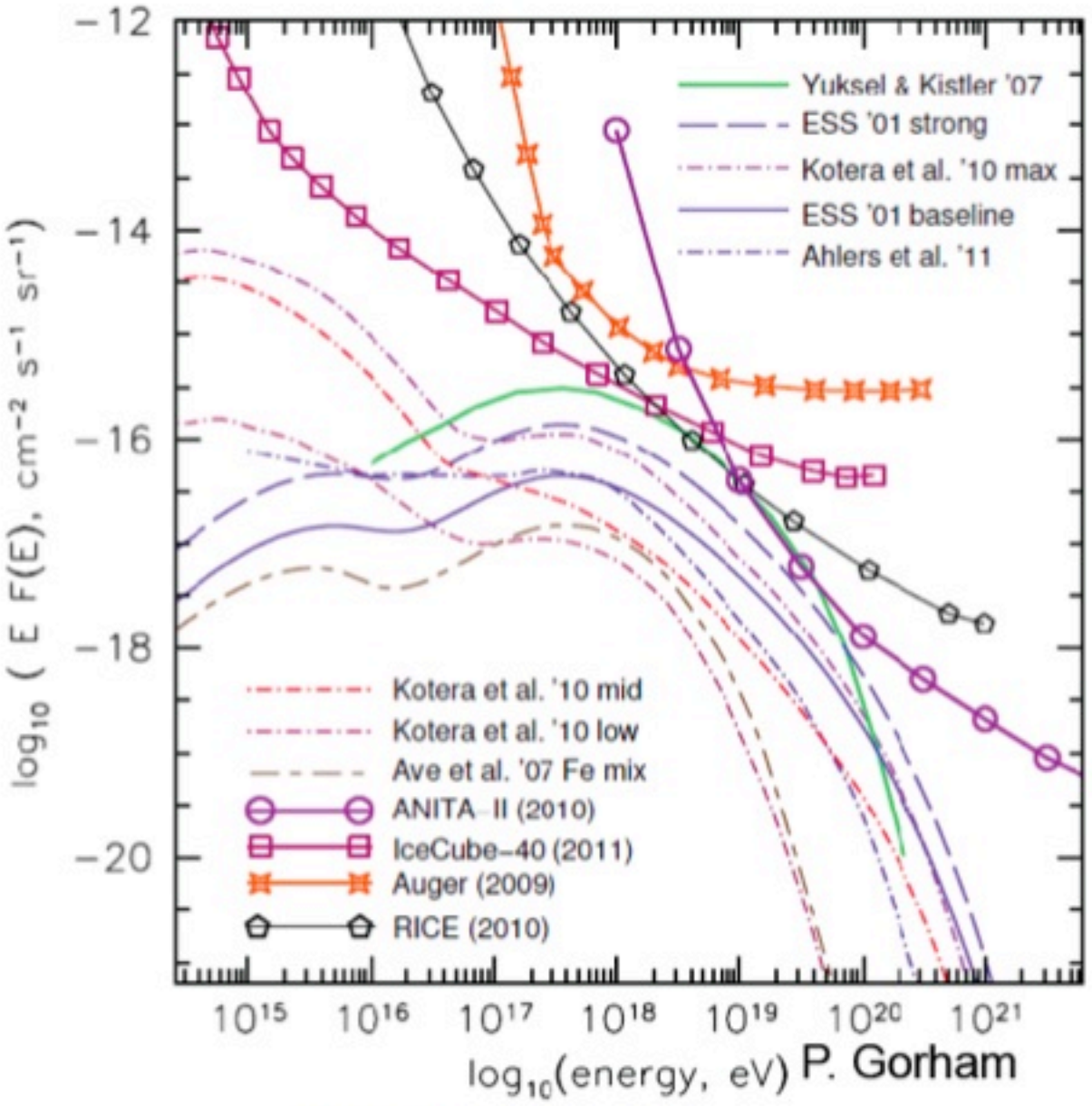
What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

The prospects are very good (modulus funding) since:

There is a bottom to the range of GZK fluxes

Current efforts are ruling out the more optimistic estimates and reaching into the reasonable expectations

Current Limits



from Vieregg CSS13

CF-36

What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

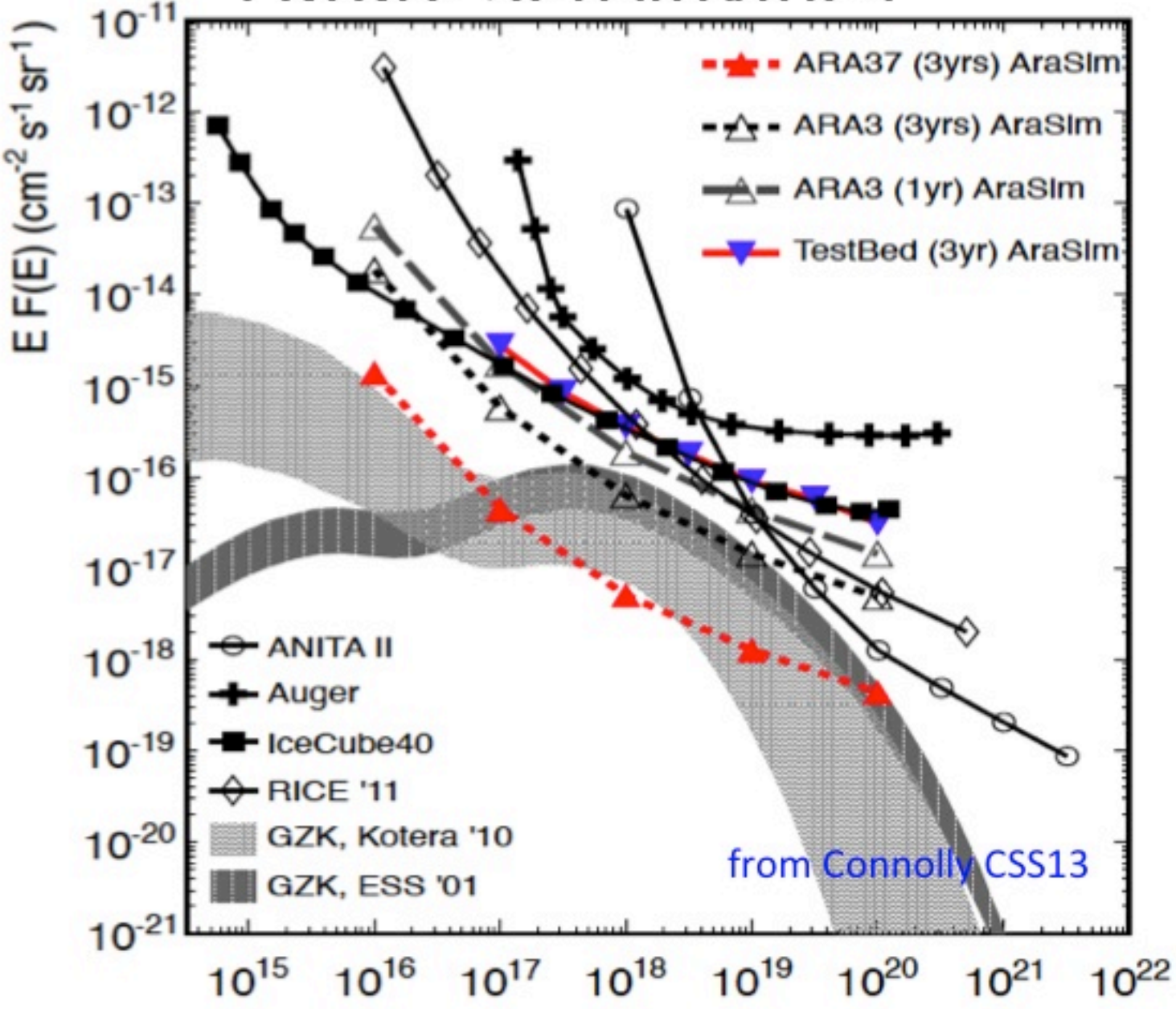
The prospects are very good (modulus funding) since:

There is a bottom to the range of GZK fluxes

Current efforts are ruling out the more optimistic estimates and reaching into the reasonable expectations

Next generation can improve by 1 order of magnitude

Future Sensitivities



CF-36

What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

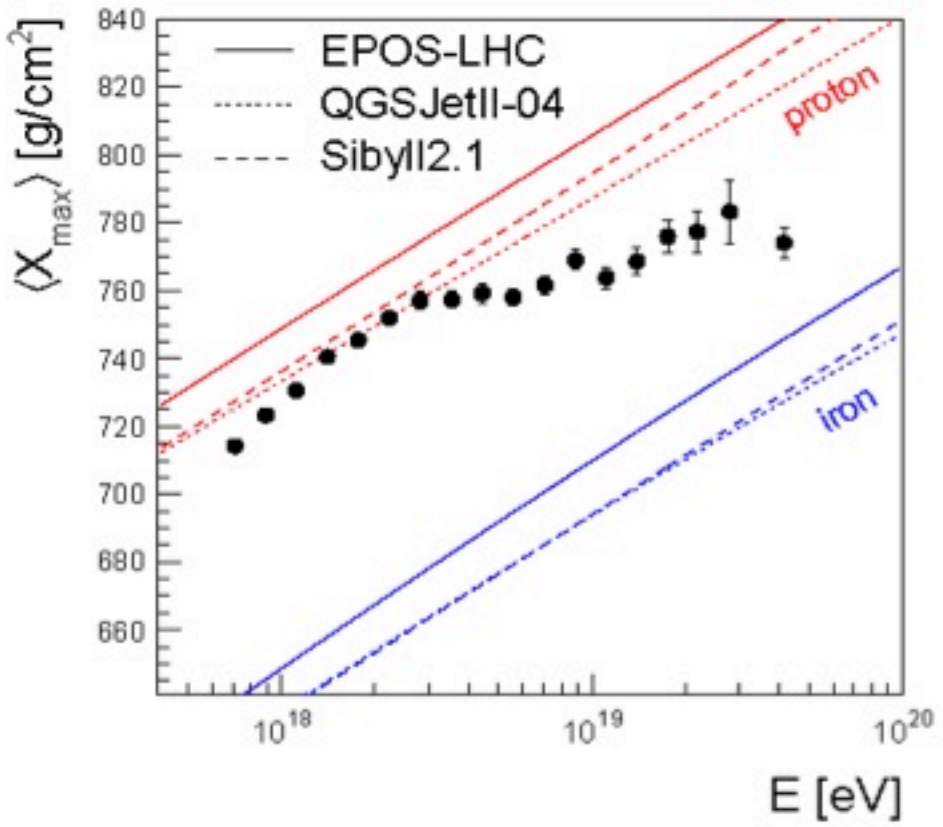
The prospects are very good (modulus funding) since:

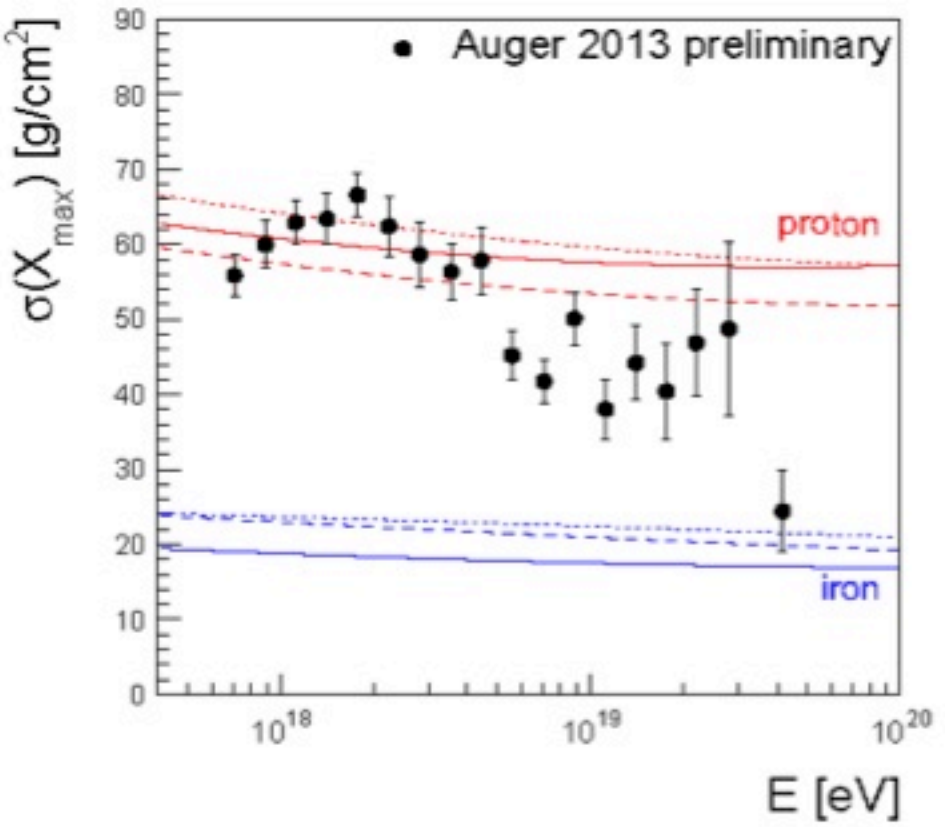
There is a bottom to the range of GZK fluxes

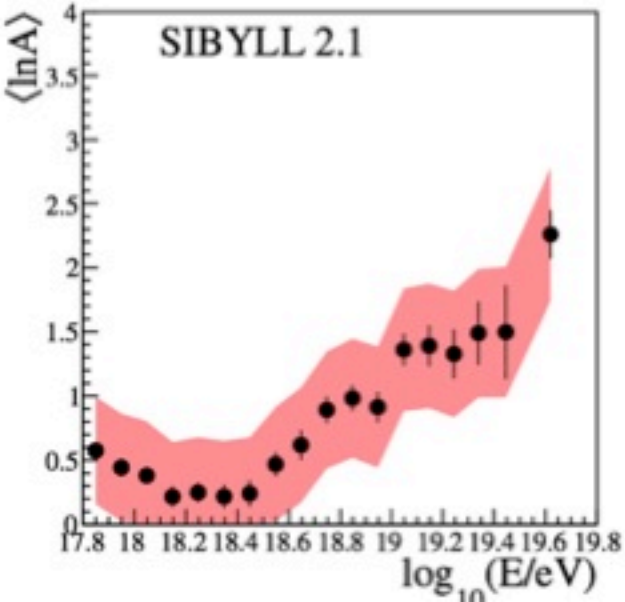
Current efforts are ruling out the more optimistic estimates and reaching into the reasonable expectations

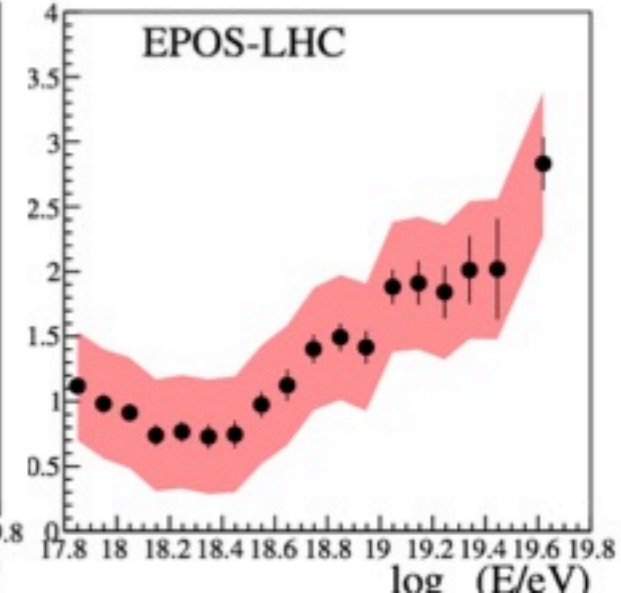
Next generation can improve by 1 order of magnitude

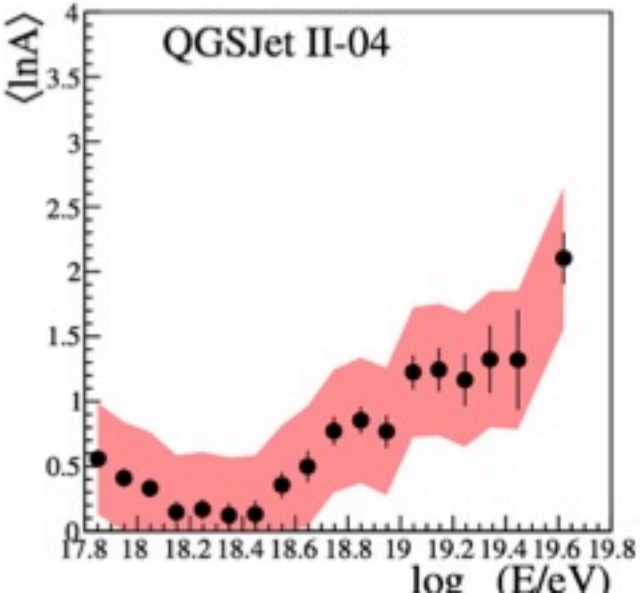
Floor is moving up as the observed "iron fraction decreases"


EPOS-LHC
QGSJetII-04
Sibyll2.1
proton
iron
⟨X_max⟩ [g/cm²]
E [eV]


Auger 2013 preliminary
proton
iron
σ(X_max) [g/cm²]
E [eV]


SIBYLL 2.1
⟨lnA⟩
log10(E/eV)


EPOS-LHC
log (E/eV)


QGSJet II-04
⟨lnA⟩
log (E/eV)

CF-36

What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

The prospects are very good (modulus funding) since:

There is a bottom to the range of GZK fluxes

Current efforts are ruling out the more optimistic estimates and reaching into the reasonable expectations

Next generation can improve by 1 order of magnitude

Floor is moving up as the observed "iron fraction decreases"

Could observe GZK neutrinos in next decade.

CF-36

What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

The prospects are very good (modulus funding) since:

There is a bottom to the range of GZK fluxes

Current efforts are ruling out the more optimistic estimates and reaching into the reasonable expectations

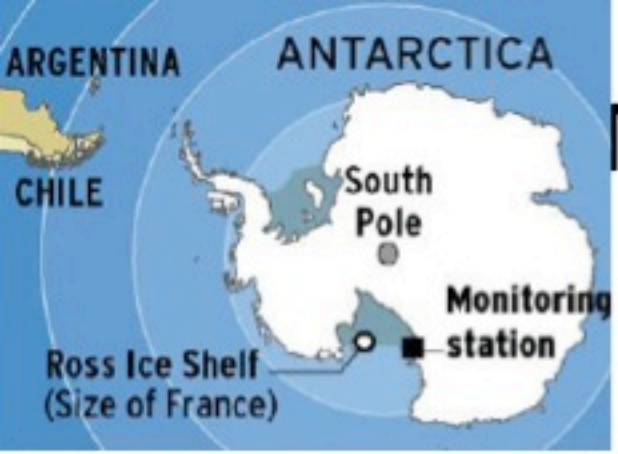
Next generation can improve by 1 order of magnitude

Floor is moving up as the observed "iron fraction decreases"

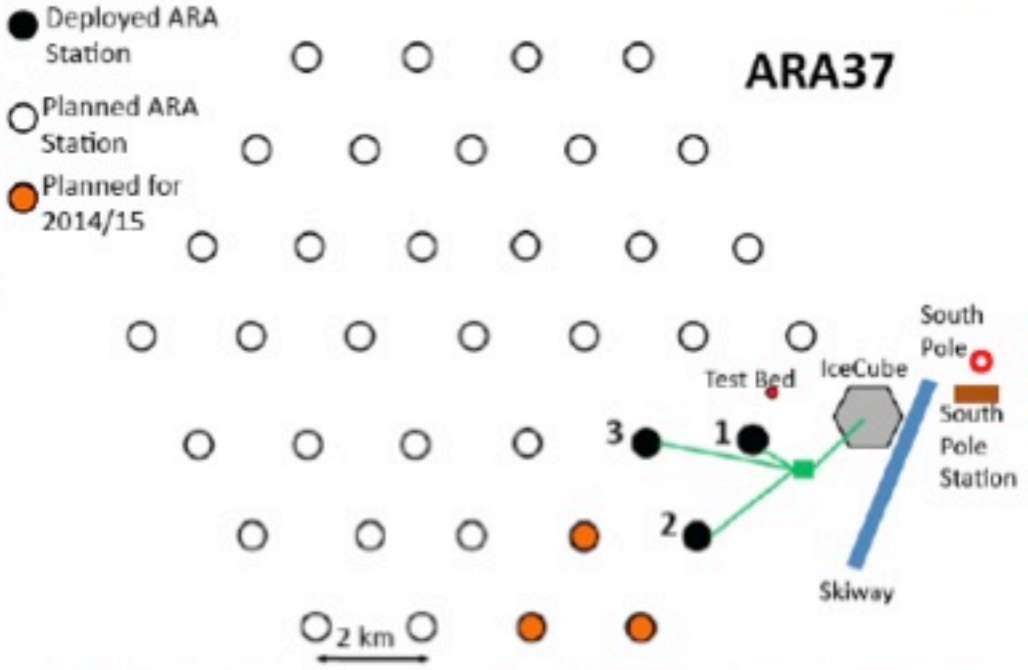
Could observe GZK neutrinos in next decade.

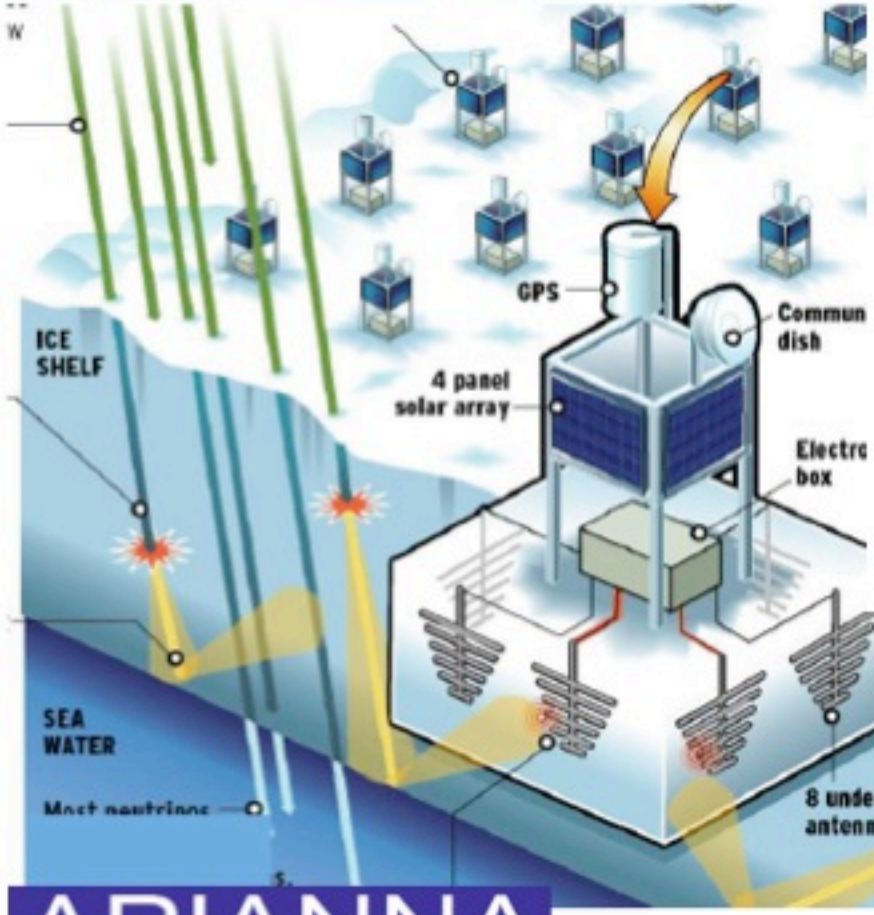
What experiments: those I showed in my talk.

Next Generation



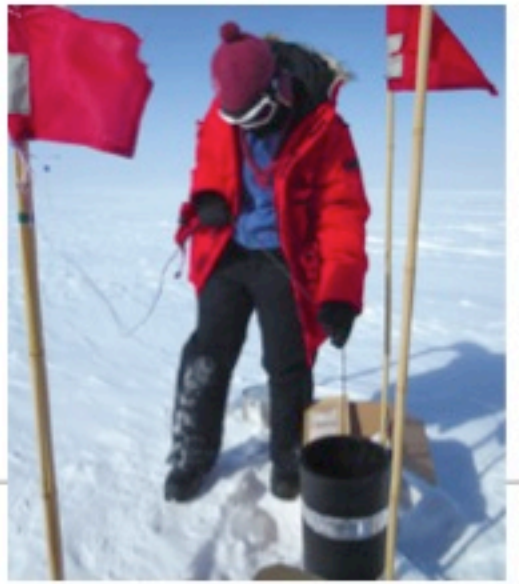
ARA: Askaryan Radio Array





ARIANNA

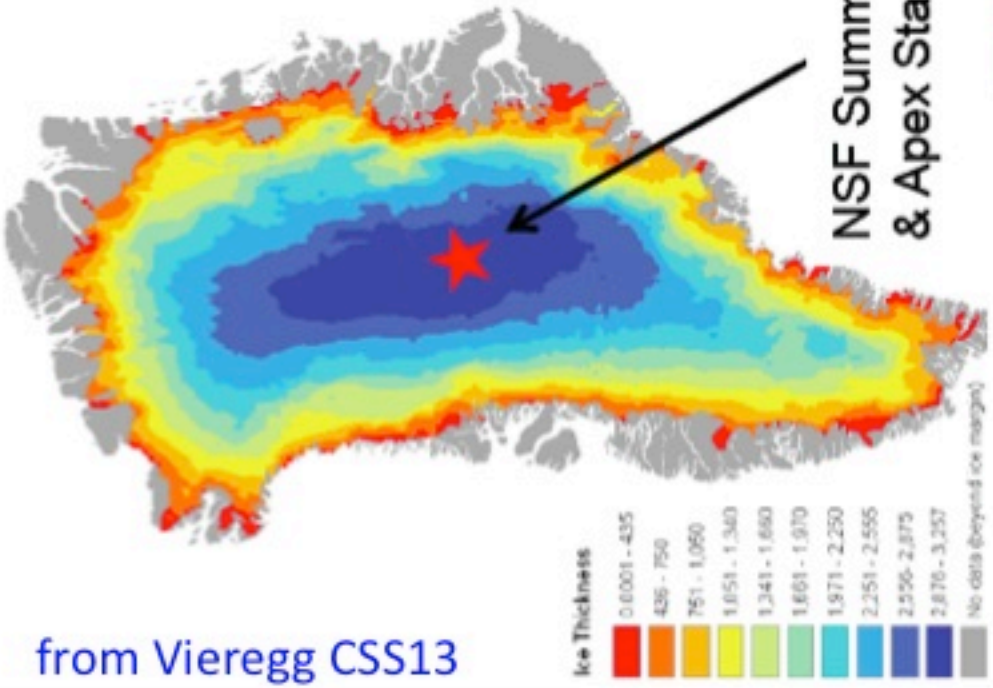
Kiv:1207.3846



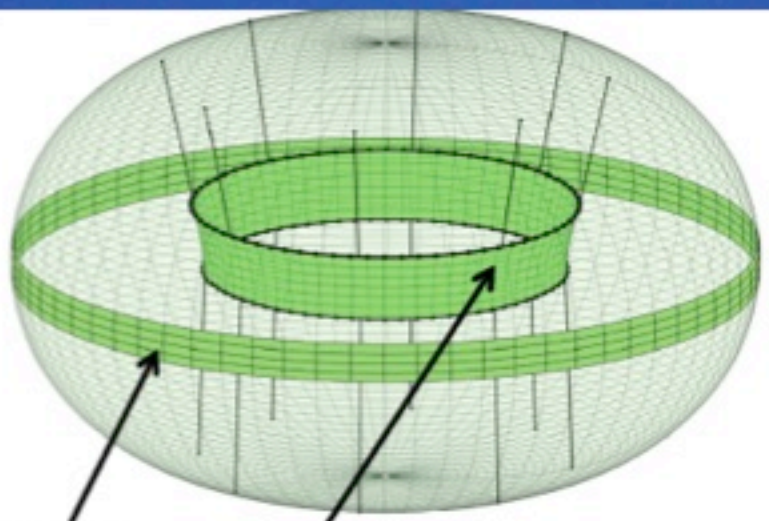
EVA:
ExaVolt Antenna

Greenland Ice Thickness

NSF Summit Station
& Apex Station Site



from Vieregg CSS13



reflector

feed array @ focus

CF-36

What are the leading prospects for detecting GZK neutrinos? What experimental program is required to do this in the next 5 years, 10 years, 20 years, and how important is this?

The prospects are very good (modulus funding) since:

There is a bottom to the range of GZK fluxes

Current efforts are ruling out the more optimistic estimates and reaching into the reasonable expectations

Next generation can improve by 1 order of magnitude

Floor is moving up as the observed "iron fraction decreases"

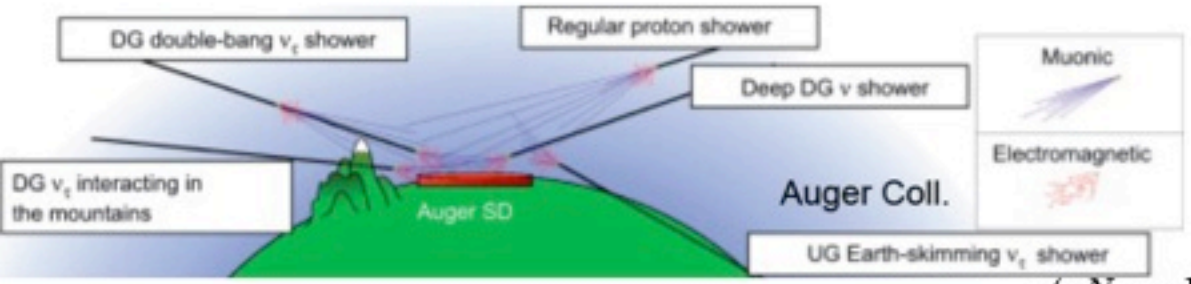
Could observe GZK neutrinos in next decade.

What experiments: those I showed in my talk.

How important: - **100 TeV CM neutrino interactions!!!**

- Understand Cosmic Accelarators

Tests of UHE Neutrino Interactions



$$N_{ES} \approx C_{ES} \frac{\Phi^\nu}{\Phi_0^\nu} \frac{\sigma_{CC}^{\nu\,2}}{(\sigma_{CC}^\nu + \sigma_{NP}^\nu)^2}$$

$$N_{QH} = C_{QH} \frac{\Phi^\nu}{\Phi_0^\nu} \frac{\sigma_{CC}^\nu + \sigma_{NP}^\nu}{\sigma_{CC}^\nu}$$