

Towards a Global Cosmic Ray Observatory (GCOS)

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Multi-messenger sensitivity required



Target photons or gas

Combination of short and large-distances



Pices Celus Superclusters Pices Celus Superclusters Contact and the supercluster Superclusters Super HESE 4yr with $E_{dep} > 100$ TeV (green) / Classical $v_{\mu} + \bar{v}_{\mu}$ 6yr with $E_{\mu} > 200$ TeV (red)



Neutrinos (transient events)

(Ahlers & Halzen, PTEP 2017)



Auger 2014 E \geq 52 EeV (×) / TA 2014 E \geq 57 EeV (+) / smoothed anisotropy map ($\Delta\theta_{50\%}=20^\circ)$

Aperture and energy resolution matters



Mass composition sensitivity is key feature



Summary: Global Cosmic Ray Observatory







- Ultra-large aperture (~100,000 km sr) -
- Composition sensitivity essential
- Good energy resolution (~20%)
- Multi-messenger instrument
- Full-sky observations (space-borne instrument or several observatory sites)
- Include geo-sciences etc.
- Helmholtz funding: use name GCOS

Germany: Helmholtz Roadmap 2015