A review of the astrophysical GeV neutrino emission searches with IceCube and KM3NeT

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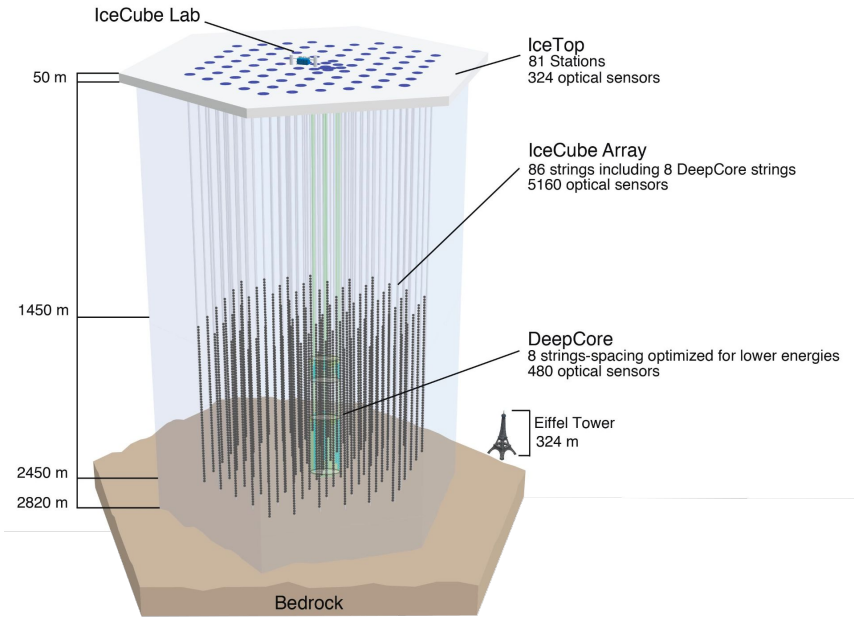
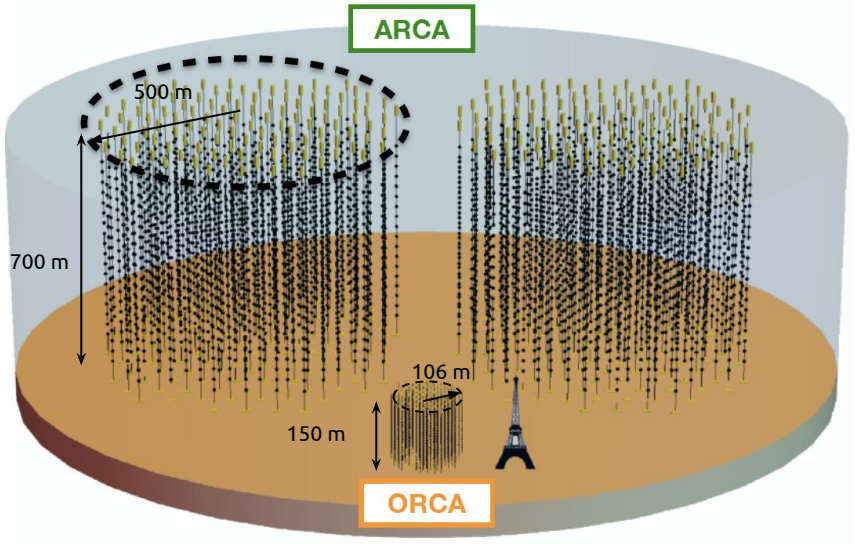
fnrs
FREEDOM TO RESEARCH

UCLouvain

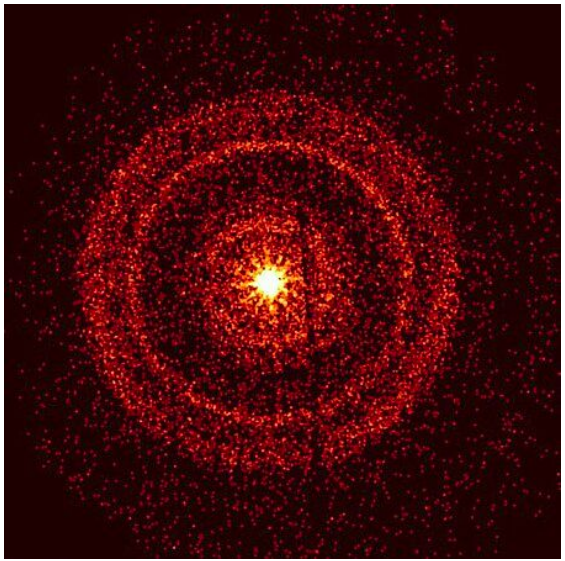
IceCube and KM3NeT

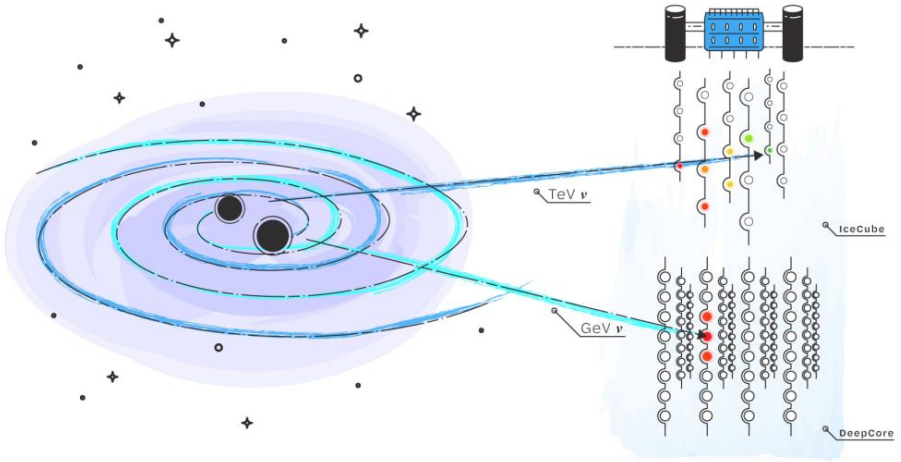




IceCube and KM3Net energy ranges

Current searches for GeV neutrino Sources





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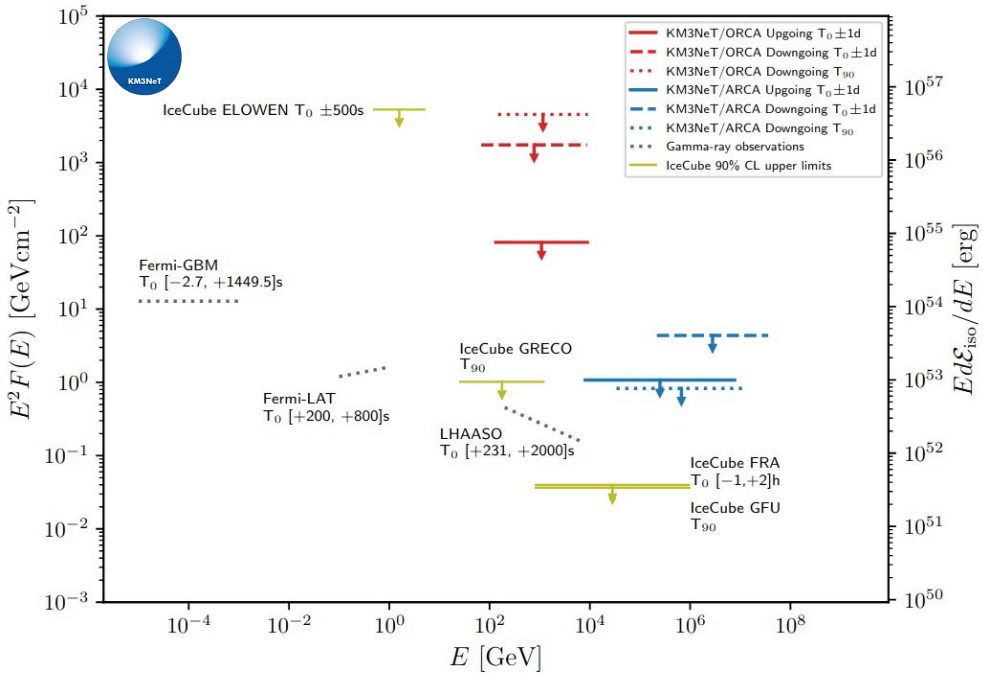
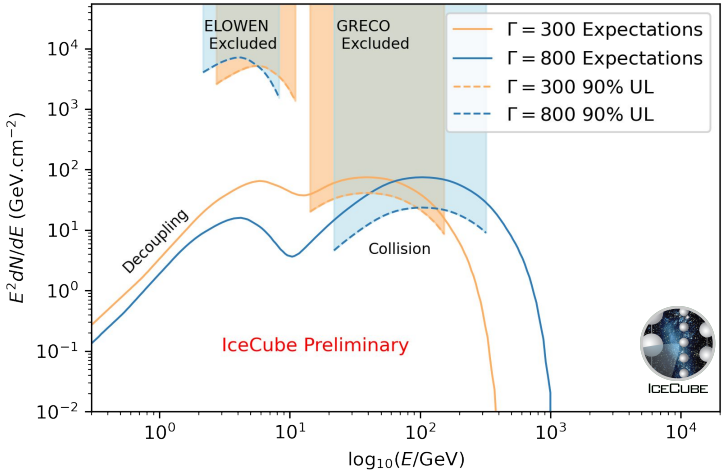
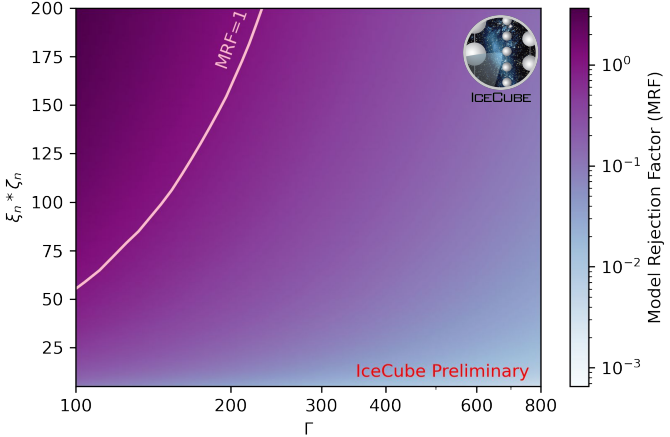
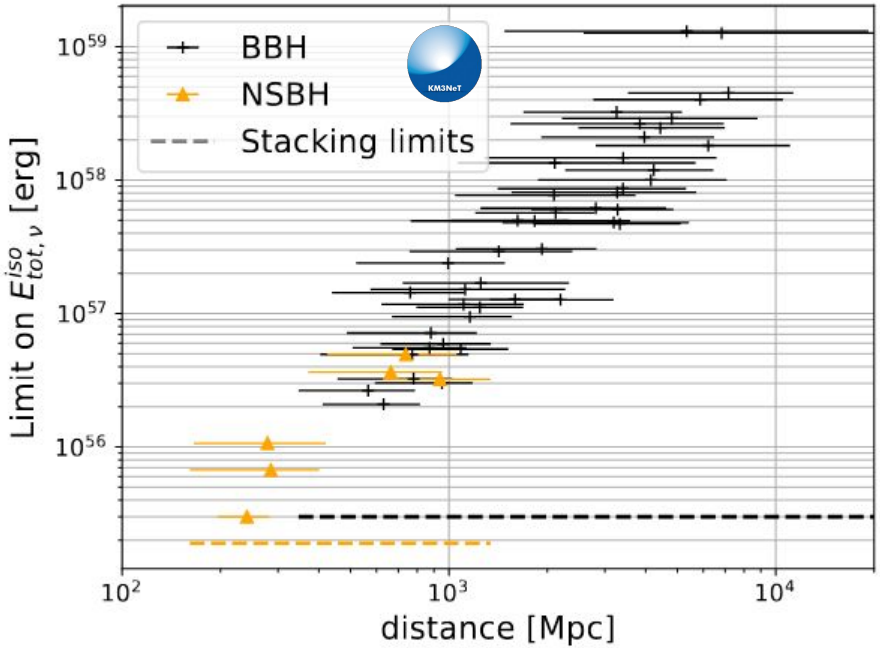


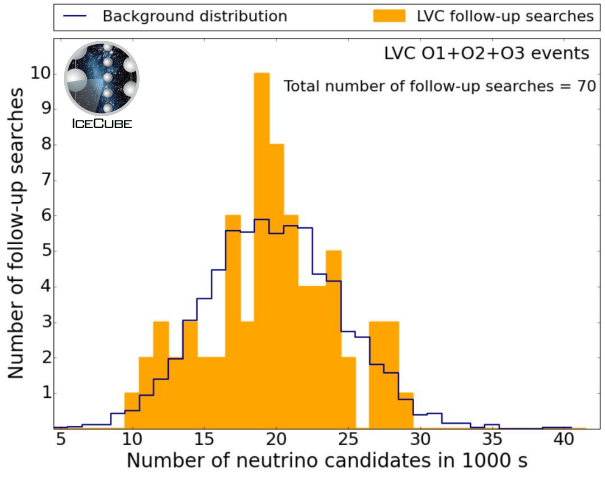


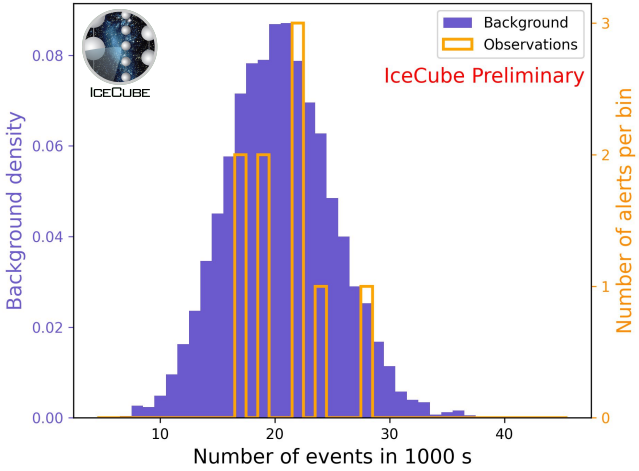


JCAP 08 (2024) 006; PoS ICRC2023 (2023) 1511; Astrophys.J.Lett. 946 (2023) 1, L26

Gravitational waves

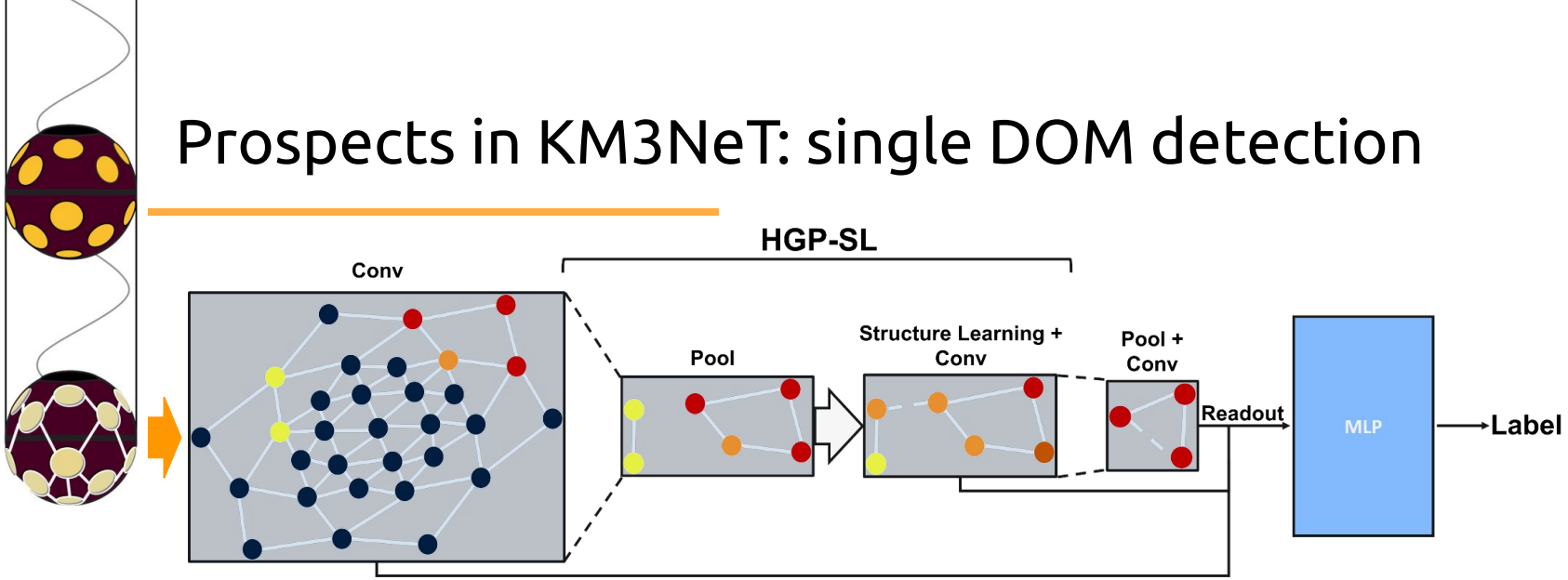






JCAP 04 (2024) 026; PoS ICRC2023 (2023) 1513; 2105.13160 [astro-ph.HE]

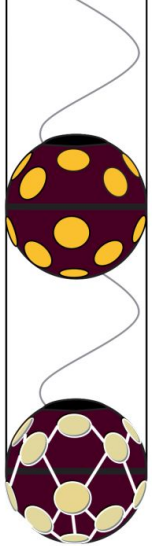
Prospects in KM3NeT: single DOM detection

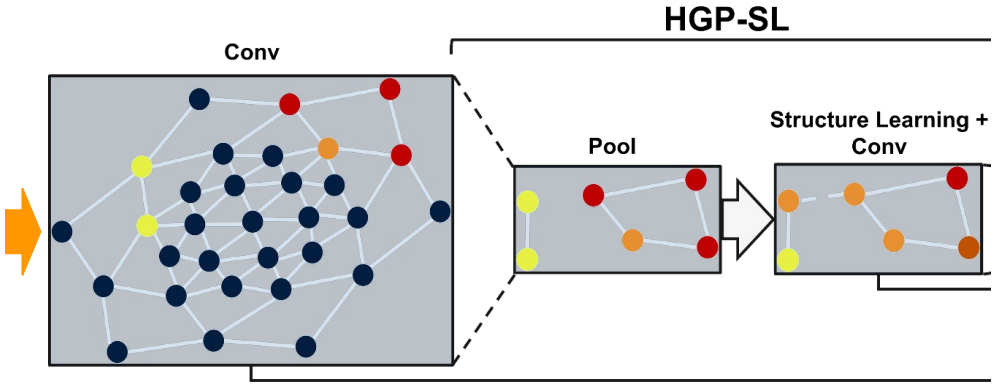


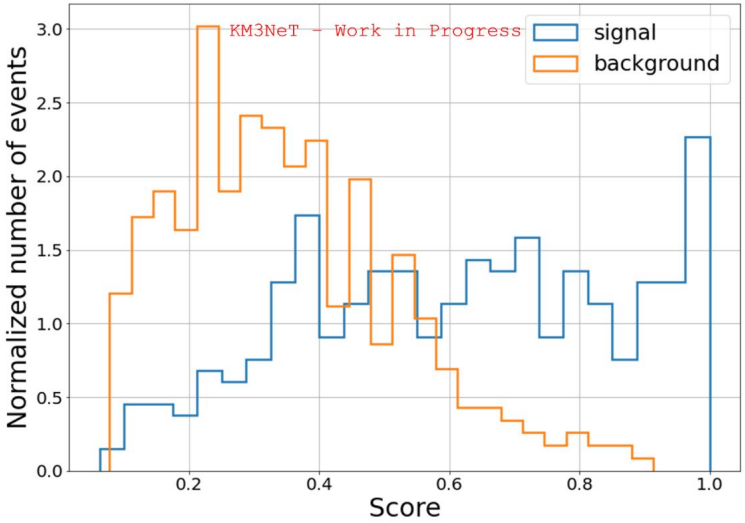
Time over Threshold as node attribute

3 Graph Convolutional Networks (GCN) layers

Prospects in KM3NeT: single DOM detection







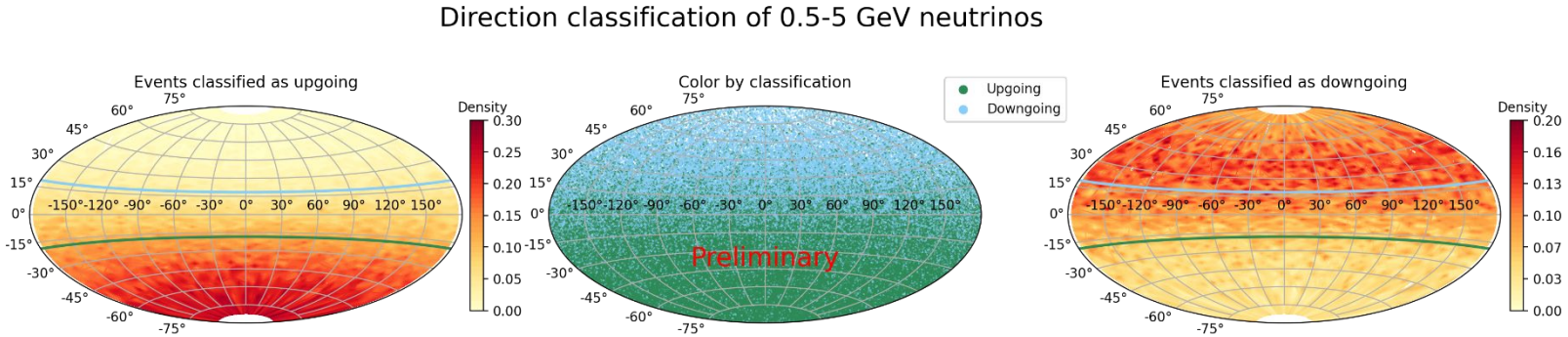
Time over Threshold as node attribute

3 Graph Convolutional Networks (GCN) layers

Prospects in IceCube: ELOWEN

Spacing too large for normal reconstruction

BDT using timing delays on single string: zenith direction reconstruction

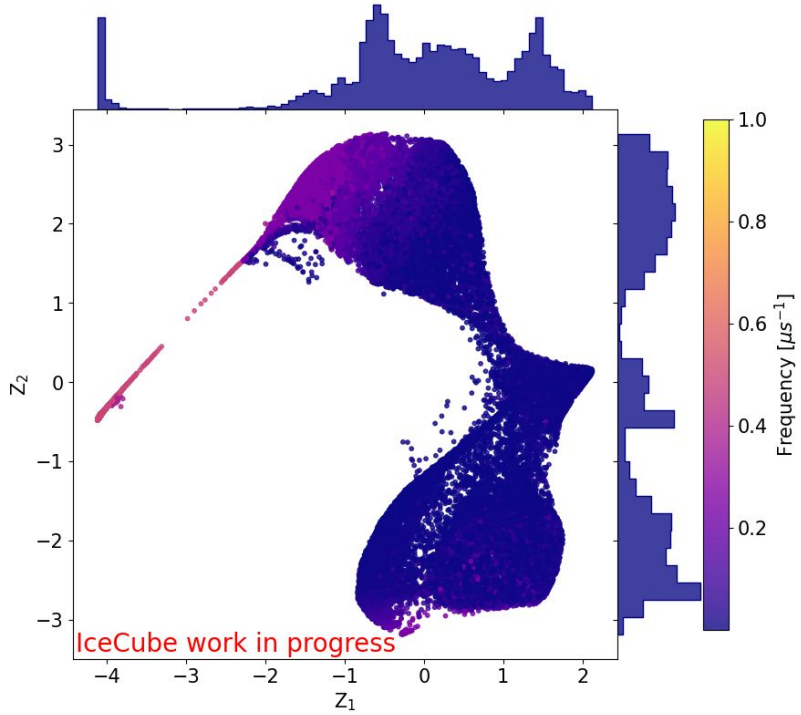


Prospects in IceCube: Sub-threshold events

HitSpool: saves all signals

Look at

- Burst size
- Charge
- Duration
- Centre of gravity
- Hit frequency



Neutrino2024 (2024)
https://doi.org/10.5281/zenodo.13899166

Conclusion

IceCube and KM3NeT can be used for GeV neutrino astronomy

Several searches have already been done

Improvements are made with Machine Learning:

- Multi-PMT single-DOM detection
- Improved filtering
- Sub-threshold events