



# KM3NeT: Multi-Messenger and Transient events

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# Paradox 1

- If a CCSN would happen today, no one would doubt the LE neutrinos and the following EM signal are connected
- Several HE neutrinos correlated with EM sources that do not always reach a consensus in the community
- Will a joint observation in several neutrino telescopes will help? Is source population studies the only way to confirm the associations?

# Paradox/question 2

- We start to have some hints of neutrino emitting source
- Source population studies sometimes give different hints than real-time searches
- How do we reconcile the two? What is the place of population studies/stacking analyses in real-time MM era?

# Paradox/question 3

- We are entering a new era from mainly IceCube (and Baikal and ANTARES with a smaller size) to large neutrino telescopes
- Most of the predictions are for one telescope.
- When do we combine? How do we combine? What do model makers need to make joint predictions?

# Paradox/question 4

- Several neutrino emitting sources/candidates so far
- Do they explain the full diffuse flux observed?
- Which room remains for other population(s)?



# Paradox 5

- High quality data sample (multi-wavelength and multi-messenger) needed for a better understanding of the sources
- In 6 months from now, the alert market will be overloaded
- How to prioritize/rank the alerts to maximize the number of follow-ups while having high quality data sample

# Paradox 6

- Cascade events are crucial (more events, flavour ratio study, ...)
- Tracks are usually the priority for follow-ups as they have a better angular resolution
- Both are needed but high quality multi-wavelength sample require people responding to alerts. Again, what should be prioritize?



# Paradox 7

- More followu-ups (even sub-threshold)
- More chance to see coincident signal
- What about the trial factor?