Constraints on the localization of High Energy Neutrinos for galaxy-targetted electromagnetic followups

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Abstract

High Energy Neutrino telescopes such as IceCube or KM3NeT issue public alerts describing the characteristics of possible astrophys- ical high energy neutrino events. This information, in particular the arrival direction and the associated uncertainty of the neutrino candidates, is used by observatories to search for possible electromagnetic counterparts. Such searches are complicated by the lo- calization areas as high as tens of squared degrees or more and the absence of constraints on the distance or nature of the source, contrarily to gravitational wave alerts issued by instruments such as LIGO/Virgo. A method to derive a probable distance for astro- physical source possibly associated to a HEN event is described, which can be used in a cross-match with galaxy catalogues to search for possible electromagnetic counterparts. This is intended as a guide for high energy neutrino followup campaigns.