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Extreme Universe through the Eyes of Master Global Robotic Net[1]

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Abstract—This paper considers latest highlights in simultaneous and follow-up optical observations of high energy astrophysical phenomena by MASTER Global Robotic Net. Such extreme Universe sources includes gamma-ray bursts, gravitational wave events, detected by LIGO/Virgo, fast radio bursts, high energy neutrino sources and others. Some of the neutrinos detected by ground-based facilities owe their births to supermassive black holes – blazars, which are in a special anxious state with high statistical reliability. We discovered the effect of a rapid decrease in the brightness of the blazar PKS 0735+17 at the time of the multiple detection of the high-energy neutrino event IceCube-211208A. This decrease in brightness within several hours was detected with a high confidence (SNR 10) in comparison with a multi-day brightening state of the blazar, which was accompanied not only by a maximum increase in the average brightness, but also by an increase in the amplitude of its brightness fluctuations. Additionally, we analyzed all cases of successful observation of blazars around neutrino events and obtained statistically reliable indications of the relationship between neutrino events and optical activity of blazars in the doubled error box at the 4.2σ level.

Keywords: multimessenger observations, transients, robotic telescopes

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1. INTRODUCTION

Most of high energy astrophysical sources in the Universe like gamma-ray bursts (GRB), gravitational wave sources (GW), fast radio bursts (FRB) are connected with compact relativistic objects [1–24]. Extreme phenomena such as the most probably sources of generation of neutrinos of high and ultra-high energies and other also still have many problems and have been studied very intensively in recent years. The effective ways of their studying involve using multi-channel and multi-wavelength observations by fully robotic telescopes with identical equipment and online auto-detection system, distributed by Earth for full time control of near and far space like MASTER Global Robotic Net [10–22].

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modeled, and by the end of the 20th century, the task of experimental research in different electromagnetic ranges arose.

7. CONCLUSIONS

We presented MASTER Global Robotic Net highlights in gamma-ray bursts, gravitational wave events, fast radio bursts, high energy neutrino events sources investigation. For the IceCube-211208A event we made follow-up observations and found the blazar PKS 0735+17 in a dimmed state, against the background of a longer-term increase in optical activity. We also analyzed all cases of successful observation of blazars around neutrino events time and obtained statistically reliable indications of the relationship between neutrino events and blazars in the error squared at the 4.2σ level. We also made a short review for extreme Universe processes, that can be observed by MASTER.

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CONFLICT OF INTEREST

The authors of this work declare that they have no conflicts of interest.

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