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PEM026-P06 Room:Convention Hall Time:May 25 10:30-13:00

Confirmation of Decimeter Radio Pulses From our Galaxy Center Comparing with a Time Series of Pseudo Random Number

Asuka Nishizaka[1*], Hiroshi Oya[1], Takayuki Ono[2]

[1]Geophys. Sci., Tohoku Univ., [2]Geophys. Sci., Tohoku Univ.

In 1999, the discovery of 24 kinds of radio pulses was made in the decameter radio wave frequency range [Oya and Iizima, 1999]. The levels of these pulses were in a range with the order of about 0.1% of the background level of the decameter radio waves from the center part of our Galaxy. As origins of these decameter radio wave pulses, the authors proposed possible radiations from the rotating black holes in the center part of our Galaxy. The 24 kinds of periods ranging from 0.327214sec to 129.992sec are considered to be generated from the rotating Kerr black holes coinciding with the rotation periods of black holes. Further studies for the radiation characteristics of Kerr black holes [Oya,2011] indicate that the detectable period of the radio wave pulses have sources near the event horizon. These works also indicate that the rotation periods show divergence for the radiation sources which are located at the position a part from the event horizon. The deviation rate of the rotation period becomes larger corresponding to longer distance apart from the event horizon, even in the region close to the event horizon. It is further clarified by his paper that the red shift rate of the radiated electromagnetic waves varies as a function of the source position, approximately depending on the root of the deviation rate of distance from the event horizon. When it is assumed that the radiation frequency is controlled by the red shift rate, it is suggested that the decimeter radio wave pulse period is spread wider than the cases of decameter radio wave pulses. To confirm this theoretical prediction, we observed center part of our Galaxy at 1.4GHz with 10m dish antenna, in 2007 and 2008 at Fukui University of Technology where the receiving systems for decimeter radio waves are facilitated.

The present studies are concerned with analyses of the observation data of decimeter radio wave pulses whose levels show a range from 1/1000 to 1/10000 of the background level of the decimeter radio waves from the center part of our Galaxy. To search for the pulse shape, then, 1200000 times of period coherent accumulations of time series data, i.e. box-car method, have been applied, after the coarse decision of the pulse periods by applying FFT method. For this purpose, the data during 21 days observations are utilized. To carry out the box-car method, the periods for analyses have been swept with step of 4/100000 of the center periods for search. The obtained wave forms are evaluated defining the index which gives identification of the quality of the detected pulse forms distinguished from background noise.

Because of the extremely low signal to noise ratio with the order of 0.01% of the background noise level, comparison of the analyzed results with those for time series of pseudo random numbers has been made. Consequently it is verified that the results for decimeter pulses are confident; we can utilize them to investigate the deviation of the period to compare with that of decameter radio wave pulses.

Reference

(1)Oya.H. and M.Iizima, Clusters of Super Massive Black Holes in the Central Region of Our Galaxy Observed by Decameter Radio Wave Pulses: Discovery of 24 Super Massive Black Holes and Their Motions, Tohoku Geophys. J.,35, 1-78(1999)

(2)Oya.H, On the Detection of Rotation Periods of Kerr Black Holes, submitted to Apj(2011)