# Discovery of Decimeter Radio Wave Pulses from Super Massive Black Holes in the Center Region of Our Galaxy

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1.Introduction

In 1999, the discovery(Oya and Iizima, 1999) of 24 kinds radio pulses with periods ranging from 130sec to 0.3sec have been made in the decameter radio wave frequency range. Considering the characteristic of pulses, it has been concluded that radio pulses discovered in the center part of our Galaxy are radiated from rotating super massive black holes. The mass of black holes which linearly depends on the rotation period is estimated to be 5000 solar mass versus 1 sec of the period. The source regions of the decameter pulses are concluded to be located in regions extremely close to the event horizon of Kerr black holes where time passage becomes extremely slow due to red shift as predicted from the Kerr metrics. In this context, it is important to observe the spectra indices of radiated pulse waves. For this purpose we start with the observations of the decimeter waves from the Galaxy center using the decimeter radio wave observation facility at Awara campus of Fukui University of Technology .

2. Observations

Observations for the center of our Galaxy have been made since July 25, 2005, with 1.4GHz band where the frequency is selected at 1435.000MHz, 1400.000MHz, 1425.000MHz and 1409.705MHz, and the observation frequency have been switched to 1.6GHz band where the center frequency is selected at 1610.090MHz, 1625.000MHz, 1634.995MHz and 1641.000MHz since August 16, 2005. The data have been sampled with a rate of 2Hz during these periods of observations. For all of these periods , 3.6x10^6 data points corresponding to 125 hours observation are obtained by tracking in the direction of the center of our Galaxy.

3. Data analyses

Because the objects of analyses are pulse signals of extremely low S/N ratio which are buried in intense back-ground emissions of our Galaxy, the data handling should be done with critical care not to be contaminated by noises from all kinds of artificialy pulsating sources. The base to avoid this type of contamination is to take long time average of analyzing results of FFT. Being based on the starting information of periods indicated by FFT results, the box-car accumulation method has been applied to measure more accurate pulse periods to confirm the existence of pulses from the Galaxy center. The resultant pulses larger than 0.1% of the background cosmic noise, apparently show higher level than the error limits corresponding to the statistics of the accumulation times of 1.5x10^4 in the box-car analyses.

4. Conclusion

As the results of observations made from July 25 to August 26 in 2005 in decimeter wavelength range at 1.4GHz and 1.6GHz bands, the pulses with periods of 129.995 sec, 104.550 sec, and 52.003 sec have been identified. Considering the coincidences of source direction in our Galaxy center and pulse periods also with similarity of pulse shapes between decimeter and decameter radio waves pulses, the decimeter wave pulses detected by present study are concluded to be radiated from the pulse sources, Gaa,Gab and Gac that are disclosed to be super massive black holes as results of investigation of radio pulses in the decameter wavelength range.

Reference: 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 Geophysical Journal, Science Rep. Tohoku Univ.,Ser. 5, 35, No.2, 1-78,1999