Contribution of IMPAN to MLDC
Round 2

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We have participated in Challenge 2.1 - Galactic Foreground. We have analyzed only part of the bandwidth of the simulated data. Namely we have attempted to detect all the binaries for gravitational wave frequency in four bands:

1. $6.5 - 7.0$ mHz
2. $7.8 - 8.6$ mHz
3. $8.9 - 9.0$ mHz
4. $> 10$ mHz

In these bands we have detected 404 signals. In particular for frequency above 10 mHz we have detected 152 signals.

Our analysis method was matched-filtering using the $F$-statistic ([1]). For filters we have used the analytic formulas developed in [1]. We have first divided the data into narrow frequency bands of 0.1mHz. In each bandwidth we have searched the signals and estimated their parameters. We have iteratively estimated the parameters of the signal, starting from the strongest signal, and removing it from the data. For each bandwidth we were estimated the number of the signals by visual inspection of the spectra. Each search for a signal consisted of an all-sky search using a hexagonal grid over the sky. The estimation of the parameters consisted of three steps. First we find the strongest signal over entire sky and frequency band. Then we search around the strongest candidate using a refined grid. Finally we use the Nelder-Mead algorithm to find the maximum of the $F$-statistic and accurate estimates of the parameters.

References