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CONCLUSION

For this thesis we studied X-ray transients. In addition we also studied some methods to study these transients, both observationally and in terms of the instrument used.

The first transient studied is a black hole binary system IGR J17091-3624 which showed variabilities in its lightcurves similar to GRS 1915+105, another black hole transient. This thesis used the pre-variability phase data from IGR J17091-3624 to model its mass and draw possible comparisons between its mass and GRS 1915+105. A conjecture on the possible reason for the variabilities was put forth. This opens up future avenues of works for locating other black hole sources with such variability features. As shown in this work, such variabilities need not be restricted to super Eddington accreting black hole sources and hints of such variabilities have already been seen in GX 339-4. Complete modelling of the different spectral states of GRS 1915+105 and GX339-4 for making further comparisons with IGR J17091-3624 is another work which can carry this research forward.

The second transient studied is a neutron star binary system 4U 0115-634 which showed cyclotron line features called CRSFs in its energy spectrum. With higher signal to noise and wider energy range data than used previously to model the spectrum, the work done in this thesis indicates a possible presence of two line forming regions in this binary neutron star. This immediately provides opportunities for further work of verifying this possibility using wide energy high SNR data as available from *ASTROSAT* and *NuSTAR*. A second method of probing the line forming regions using polarized spectrum needs to be worked out further in detail using theoretical models and simulations of the observed polarized spectrum. Although such observations may not happen in the next few years time, building such models is an immediate requirement which can then be verified by these observations, when available.

The last bit of work in this thesis consists of studying a currently operational sky monitor and a semiconductor detector back-end to propose a realisable sky monitor. This sky monitor shall not only be able to monitor long term variations in multiple exciting transients as the two sources mentioned previously, but also be able to stare at one such transient for deeper studies of a single transient source. Optimization between these two use cases of a sky monitor is presented using a possible solution of multiple sky monitor units. The work which this design raises is development, testing and eventual realization of such a monitor network. The challenges in building and testing individual pixels for such a monitor are listed in this thesis.

Thus, in this thesis we have gone from studying two individual X-ray transients systems for understanding the accretion physics in each of them to characterising a current Sky monitor to designing and partially prototyping a future Sky monitor for studying such transients. On the way,the need for monitoring the transient X-ray sky and the utility of having multiple semiconductor based monitor-cum-pointed observing instruments for studying these fascinating transients was highlighted. We also studied the possibility of using a Si PIN based detector for making such instruments. It is hoped that the work done in this thesis is of some practical use to people interested in studying the fascinating world of X-ray transients. It is also hoped that this work shall be extended to get realisable Sky monitors as envisaged in this thesis.