Efficient and cost effective design of a slitless stellar spectrograph bundled with spectrum isolation and photometric capabilities.

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Spectrographs are expensive and cumbersome to set up. Therefore, small observatories are generally deprived of spectroscopic capabilities. Our work focuses on development of a simple and affordable slitless spectrograph bundled with dependable data processing and analysis programs that can be used with all kinds of telescopes and cameras to obtain stellar spectrum which is at par with expensive and sophisticated spectrographs. Spectral plots of stars belonging to O, B, A, F, G, K, M spectral classes are recorded with the instrument and verified with published data to validate its efficacy. Spectra of Wolf Rayet Star and Hypergiant Luminous Blue Variable have also been recorded.

Also, slitless spectroscopic study of stars surrounded by dust and nebulas has been a long-standing challenge as the generated spectrum is contaminated by the dust and nebulas in the sky background. Our research work is extended to develop an image processing routine to extract stellar spectra in such cases keeping the optical and imaging setup constant.

Digital photometric filters are developed to replace the conventional optical multi filter photometric setups. This is anticipated to reduce observatory usage time remarkably. These filters are used with spectroscopic data to make chromatic and photometric measurements. Photometric filters of any desired bandpass can be generated and all such filters can be applied to any prerecorded data which is a major advantage over the existing photometric technique. Color Index of many stars have been determined and compared with known standard data to validate the effectiveness of the technique.

Our instrument and technology is capable of solving long standing problems in spectroscopy and photometry and also additionally makes slitless spectroscopy within the reach of small observatories and astronomers.