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arcesetc: ARC Echelle Spectrograph Exposure Time Calculator

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Software

- Review
- Repository
- Archive

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Summary

The ARC Echelle Spectroscopic (ARCES) Exposure Time Calculator, or `arcesetc`, is a simple exposure time calculator for the ARCES instrument on the Astrophysical Research Consortium (ARC) 3.5 m Telescope at Apache Point Observatory for stellar spectroscopy. Users can supply `arcesetc` functions with the spectral type of their target star, the V band magnitude, and either: the desired exposure time in order to determine the counts and signal-to-noise ratio as a function of wavelength; or the desired signal-to-noise ratio at a given wavelength to determine the required exposure time.

We estimate the count rates for stars as a function of wavelength by fitting 15th-order polynomials to each spectral order of real observations of a star of each spectral type. These polynomial coefficients and some wavelength metadata are stored in an HDF5 archive for compactness and easy of reconstruction. Then upon calling `arcesetc`, the archive is opened and the spectral order closest to the wavelength of interest is reconstructed from the polynomial coefficients, for a star of the closest available spectral type to the one requested.

At present, the 79 stellar spectral types included in the `arcesetc` library span from mid F to mid M stars on the main sequence, a variety of M giants, a handful of O and B, and and a white dwarf and a Wolf-Rayet star. Contributions from the community are welcome to expand the library to include other spectral types.

`arcesetc` was built from the Astropy package-template, and thus includes self-building documentation and continuous integration (Astropy Collaboration et al., 2018).

Acknowledgements

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References

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