

Does a meteor's "color" reflect its composition?

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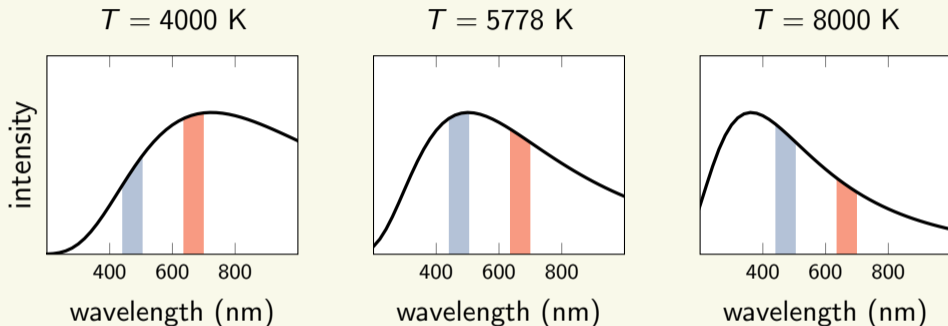
¹NASA Meteoroid Environment Office, MSFC

²ERC, Inc.

International Meteor Conference

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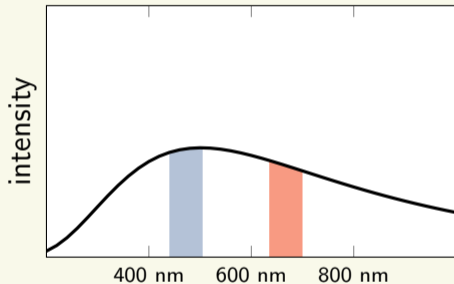
“Color” is a useful way to probe a star’s temperature



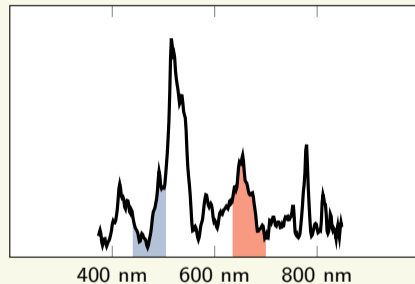
Cool stars are redder, and hot stars are bluer.
This works because stars look like black-body spectra.

However, meteors do *not* resemble black bodies.

solar spectrum



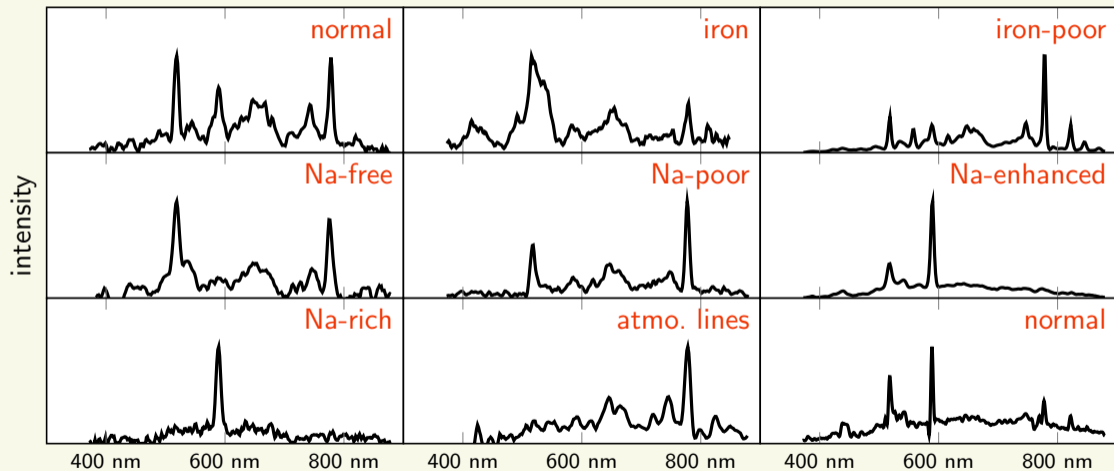
meteor spectrum



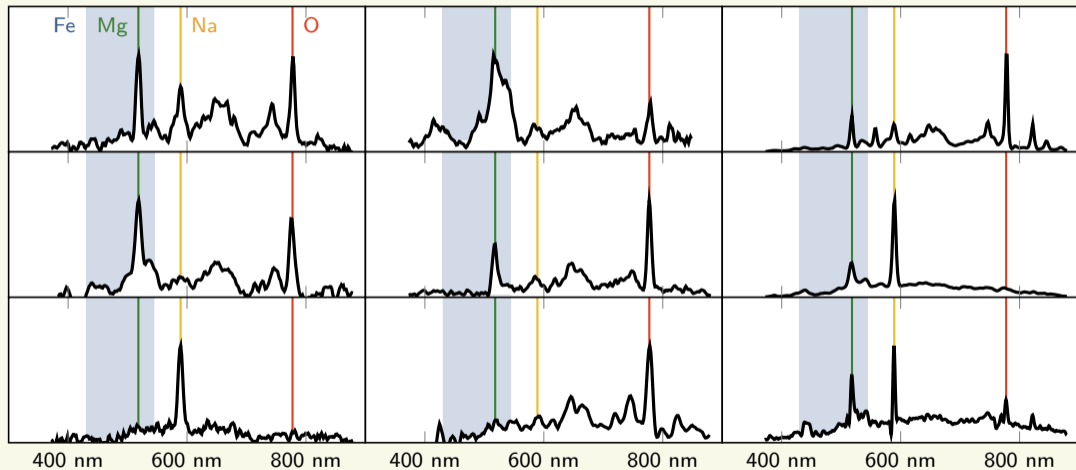
No well-defined temperature, emission is line-dominated.

Color may not be a viable way to categorize meteors.

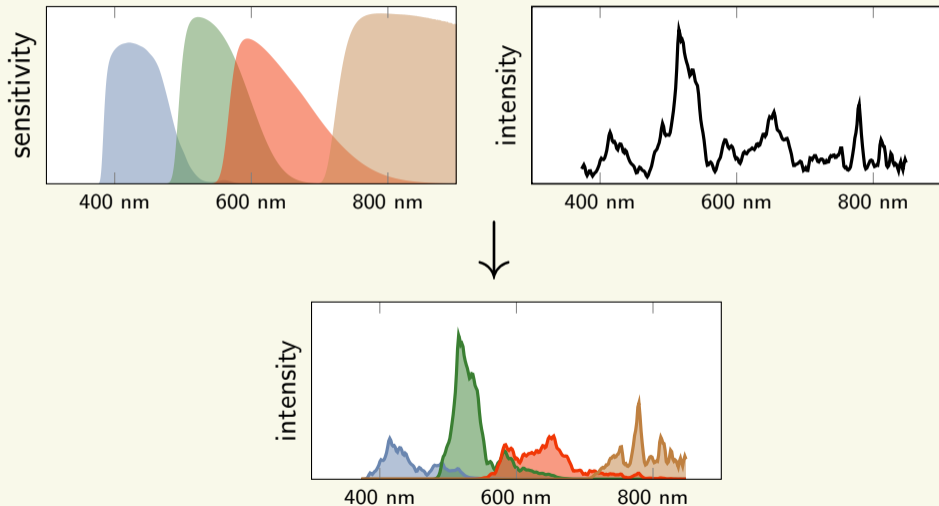
The Vojáček et al. (2015) catalog of meteor spectra and Borovička et al. (2005) classifications



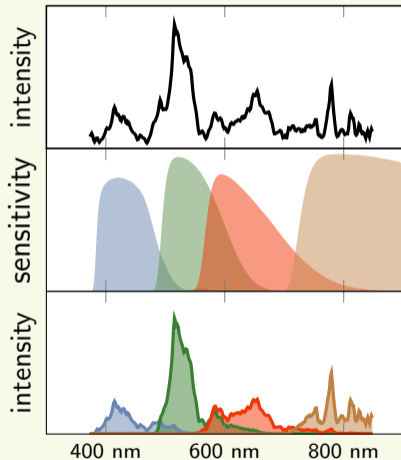
These classifications are based on key emission lines.



Furthermore, filters typically do not have uniform color sensitivity



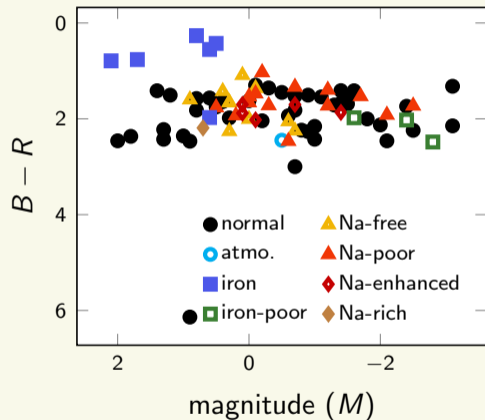
We simulate colors using standard band passes and meteor spectra



Basic approach:

- ▶ We take existing meteor spectra,
- ▶ convolve them with the transfer functions of standard Bessel filters, and
- ▶ integrate the resulting curves to obtain color (BVRI) magnitudes.

Only iron meteoroids stand apart from the crowd in a color plot.



- ▶ Most categories are indistinguishable by color.
- ▶ Only iron meteoroids appear to stand out (they are both bluer and less red than their magnitude).
- ▶ All other categories would require a full spectrum or line-specific filters.