

# Station Card: Doppler Shift Spectrometer

## Radial velocity from spectral line shifts

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*Goal:* Use the demo to make a claim supported by (1) at least one number/readout and (2) at least one sanity check.

**Demo:** /demos/doppler-shift-spectrometer/

**Artifact:** a “radial velocity” card (line + shift + claim).

- 1) Pick a line (H or Na D).
- 2) Set a nonzero velocity with the slider.
- 3) Record:
  - $\lambda_0$  (nm),
  - $\lambda_{\text{obs}}$  (nm),
  - $\Delta\lambda = \lambda_{\text{obs}} - \lambda_0$  (nm),
  - the inferred direction (approaching or receding).
- 4) Compute  $v = c \Delta\lambda / \lambda_0$  and compare to the slider readout.

 Word bank + sanity checks

**Word bank:** - **Radial velocity:** line-of-sight motion (toward/away). - **Redshift:**  $\Delta\lambda > 0$  (receding). - **Blueshift:**  $\Delta\lambda < 0$  (approaching).

**Sanity checks:** - If  $v_r = 0$ , then  $\lambda_{\text{obs}} = \lambda_0$  and  $\Delta\lambda = 0$ . - In transverse mode, wavelengths do not change.