# Presenting Uncertainties

Phys 238: Intermediate Physics Lab

March 24, 2025

**Abstract**

Uncertainties should be presented in a way that is clear to the reader.

For the second part of the torsional oscillator lab, suppose you found $\omega_0 = 4.404\,26\,\mathrm{rad\,s^{-1}}$ with an uncertainty of $2.67 \times 10^{-5}\,\mathrm{rad\,s^{-1}}$. How can you express that usefully? Compare these attempts:

| | |
|---|---|
| Plain | $(4.40426 \pm (2.67 \times 10^{-5}))$ rad/s |
| Rounded | $(4.40426 \pm (3 \times 10^{-5}))$ rad/s |
| Using the `\SI` package | $(4.404\,26 \pm 0.000\,03)\,\mathrm{rad\,s^{-1}}$ |
| Bracketed uncertainty | $4.404\,26(3)\,\mathrm{rad\,s^{-1}}$ |
| Alternate mode for reciprocal | $4.404\,26(3)$ rad/s |

When the uncertainty is small compared to the value, the bracketed form is usually easier to read. If the uncertainty is much larger, than either is usually fine, such as the following:

| | |
|---|---|
| Bracketed uncertainty | $4.40(3)\,\mathrm{rad\,s^{-1}}$ |
| Separate uncertainty | $(4.40 \pm 0.03)\,\mathrm{rad\,s^{-1}}$ |

You can also either include the options to `\SI` each time you use the command, or put your favorite options in once as options to the `\usepackage` command in the preamble of your document.