II Sources & Types of Uncertainty

II.1 Two broad Sources: Analytical & Analytical Error: arise from Sampling measurement technique

- "electronic noise"
- "drifts" e.g. baseline drift
- loss of light intensity on detector from dirty optics
- you are often part of device

→ "parallax" & "interpolation"

Sampling Errors : 1) inherent characteristics of system give rise to fluctuations in measured property

2) Measurements are inadequate representations of actual system or actual variability

II.2 Types of Errors : Random & Systematic

random : irregular, non-reproducible fluctuations

→ can be quantified by repeating measurements under same set conditions

→ imprecision in measurements

Systematic Errors: A reproducible source of bias,

→ often difficult to assess, but can be reduced by "calibrating" to a standard, or by appropriate deployment of sensor

⇒ source of "inaccuracy"

II.3 Characterizing Uncertainty

→ Precision, accuracy & Total

- random & systematic errors manifest themselves as precision & accuracy of a measurement
- total uncertainty: sum over all sources of error

precision: how "close" individual measurements are to one another, not necessarily accurate

→ reproducibility of measurement regardless of proximity to true value

accuracy: proximity of a measured value to the true value