PRIMER ON ERRORS

8.13 U.Becker 9,2006

- Random & Systematic Errors
- Distribution of random errors
- Binomial, Poisson, Gaussian
- Poisson <-> Gaussian relation
- Propagation of Errors
- Fits

Reading assigment: Bevington CH. 1-3

No measurement has infinite accuracy or precision"

K.F.Gauss: "In experimental physics a numbers must have an error and a dimension."

$$G = (6.67310 \pm 0.00010)[m^3\ kg^1\ s^{-2}]$$

Errors = deviations from Truth (unknown, but approached)

Large error: Result is not significant/controversial.
Small error: Good measurement, will test present/future theories.

Blunders are blunders never errors – repeat on Fridays correctly.

Two types:

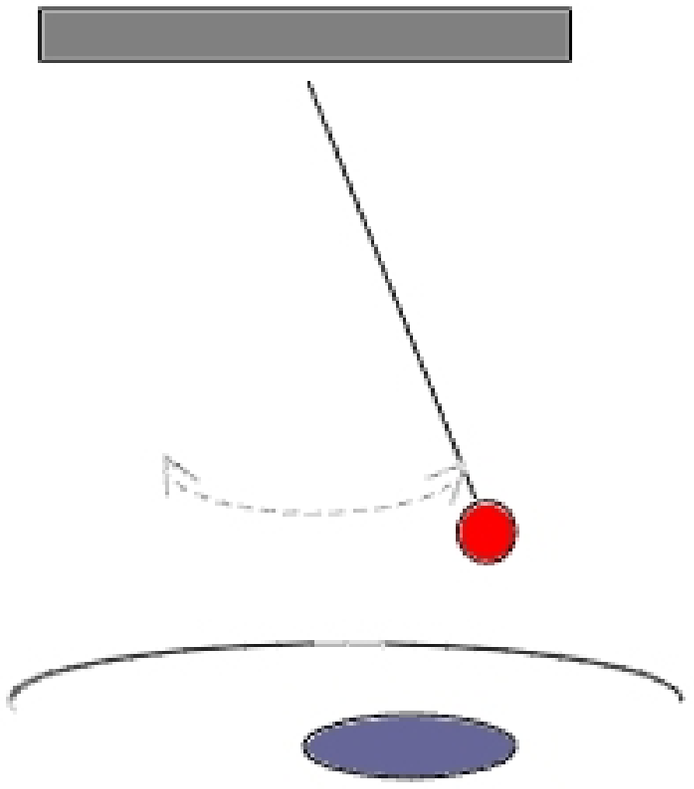
Random Errors -	repeated measurements give (slightly) different results
Systematic Errors	"in the system" DVM 2% low…correct if you can, otherwise quote seperate

Systematic error: inherent to the system or environment

example:

Measure g with a pendulum: $T=2\pi\sqrt{\frac{l}{g}}$

- neglect m of thread)
- equipment (accuracy of scale, watch)
- environment (wind, big mass in basement)
- thermal expansion
  1. correct by $l=l_0(1+\alpha t)$ if t known or
  2. give sys.error Δ_t from est. range of t.



large M below earth!!

⇒ **limits ACCURACY** (=closeness to truth)