

Hens in the Dimensions

The talk will take place in RIII seminar room on 28th of September at 19:00.

Notes prepared for this talk are now available ([CLICK](#)).

The structure of the talk will be as follows:

1. Interlude to Dimensional Analysis, Quantities and the Principle of Dimensional Homogeneity
2. Physical dimensions as a vector space
3. Bridgmann's theorem
4. Examples, and some interesting applications
5. Dimensionless quantities as a group, the Buckingham PI theorem and the principle of dynamical similarity
6. Deriving Kepler's third law with Dimensional Analysis

Dimensional analysis is one of the finest tools in the tool-set of a physicist. The idea of dimensional analysis is very simple: In physics, we're not dealing with numbers alone. We're dealing with quantities equipped with a physical dimension. The main way to play physics is as a game of restriction, and dimensional analysis is one of the tools for the job. At its simplest, dimensional analysis tells you that you can't have a physical law that relates a left hand side of position to a right hand side of time; that's the principle of time. In the depths of theoretical physics, it restricts the form of your Lagrangians, objects that determine all, to a very large degree. In fluid mechanics, particularly computational fluid dynamics, it plays a major role in determining analytical laws of very complicated systems. Even when your problem is not physics, sometimes you can manually inject dimensions as sensible to then farther figure out things about the problem with dimensional analysis.

In ~1950 or so, the US did some nuclear bomb test (Trinity test) on some desert in Mexico. While the details about the bomb were highly classified at that time, some magazine published time-stamped photos of the explosion to show off how big it is. Detective G.I. Taylor, a physicist and a fluid dynamist, only by looking at the photos, and mostly using dimensional analysis, was able to come up with a pretty good estimate of the yield of the bomb right off the bat~22 kilto tons of TNT was his result.

The accepted - but then classified - value was 20 kiltons. "classified"? bleh :P

Dimensional snacks will be provided. Until then!