

# History of the Laser

## Advanced

- ▶ Lasers are one big success story - and an embodiment of **Feynmans** famous sentence:
  - *"There are certain situations in which the peculiarities of quantum mechanics can come out in a special way on a large scale".*
  - It is *not* necessary to emphasize how important Lasers are to all of us - to the scientist, the patient in a hospital, the consumer listening to her discs, the supermarket cashier, the geometer - and just about everybody else. It should be quite clear.
  - It is, however, *quite* necessary to emphasize that Lasers (and, of course, all of solid state electronics), are purely *quantum mechanical devices*, because this is simply not known to the "people in the street" (including those in suits; and this says something about the state of general education in this country).
- ▶ Here are a few milestones in the development of the Laser.
- ▶ The first major date is **1916**, when Albert **Einstein** introduced the concept of *stimulated emission*.
- ▶ It took till **1953** to demonstrate stimulated emission experimentally. This was achieved by **Gordon, Zeiger** and **Townes**.
  - The researchers used the two lowest vibrational energy levels of ammonia molecules and obtained a very narrow emission line at **12.6 mm**, i.e. in the "micro"wave region.
  - This is where the name "*Maser*" comes from.
  - Follow-up on the "Maser" finally led to Nobel prizes shared between **Townes** and the Russians **Basov** and **Prokhorov** in **1964**.
- ▶ Meanwhile, however, **Maiman** produced the first *optical Maser*, as the Laser was originally called in **1960**.
  - The light came from **Cr<sup>3+</sup>** ions fixed in an **Al<sub>2</sub>O<sub>3</sub>** crystal - a **ruby** in other words, at a wavelength of **694,3 nm**.
  - Pumping took place with an intense light source, and the Laser only emitted a short pulse.
- ▶ **1962** the first semiconductor Laser was produced, by **N.G. Basov**.