

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 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 **Cr³⁺** ions fixed in an **Al₂O₃** 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**.