MB 11.00 am

Auditorium

Tutorial

MB1 (Invited) 11.30 am

Waveguide lasers

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The most convincing demonstration of the value of a waveguide geometry for lasers is provided by semiconductor lasers. This tutorial will however be devoted to waveguide lasers in dielectric materials, the emphasis being on planar waveguides rather than fibre waveguides, although some comparison between planar and fibre devices will be made.

So far, planar dielectric waveguide lasers have not made any significant impact either in commercial terms or in terms of finding widespread application. The basic theme of this tutorial will therefore be an examination of what waveguide lasers can, in principle, offer as an attempt to identify a future role.

The tutorial will begin with a brief coverage of the basic principles of waveguides. A very wide range of different fabrication/growth techniques has been used for preparing active waveguides, too many for exhaustive coverage in this tutorial. A few will be described, particularly where they offer features that cannot be achieved in bulk material, for example much higher neodymium doping levels are achieved in epitaxially grown Nd: YAG than can be grown in bulk form. Very many waveguide laser devices have been demonstrated. Again, rather than attempt an exhaustive survey, examples will be chosen which reveal benefits of waveguides over bulk devices. A particular benefit, and a rather obvious one, will be looked at in depth. This is the fact that much higher gains can be achieved for a given pumppower in waveguide compared to bulk. When this is combined with the rather high power capability that planar waveguides also offer, one has an interesting combination of high power and high gain, with some clear advantages of planar waveguides over either fibres or bulk, and offering new possibilities for the architecture of coherent light sources.