„Student's seminary“ presentation

OPTICAL FIBERS

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REFERENCES:

Description based on the Wikipedia article:
http://en.wikipedia.org/wiki/Optical_fiber

Pictures taken from Wikimedia (unless stated otherwise)
http://commons.wikimedia.org/wiki/Category:Optical_fibers

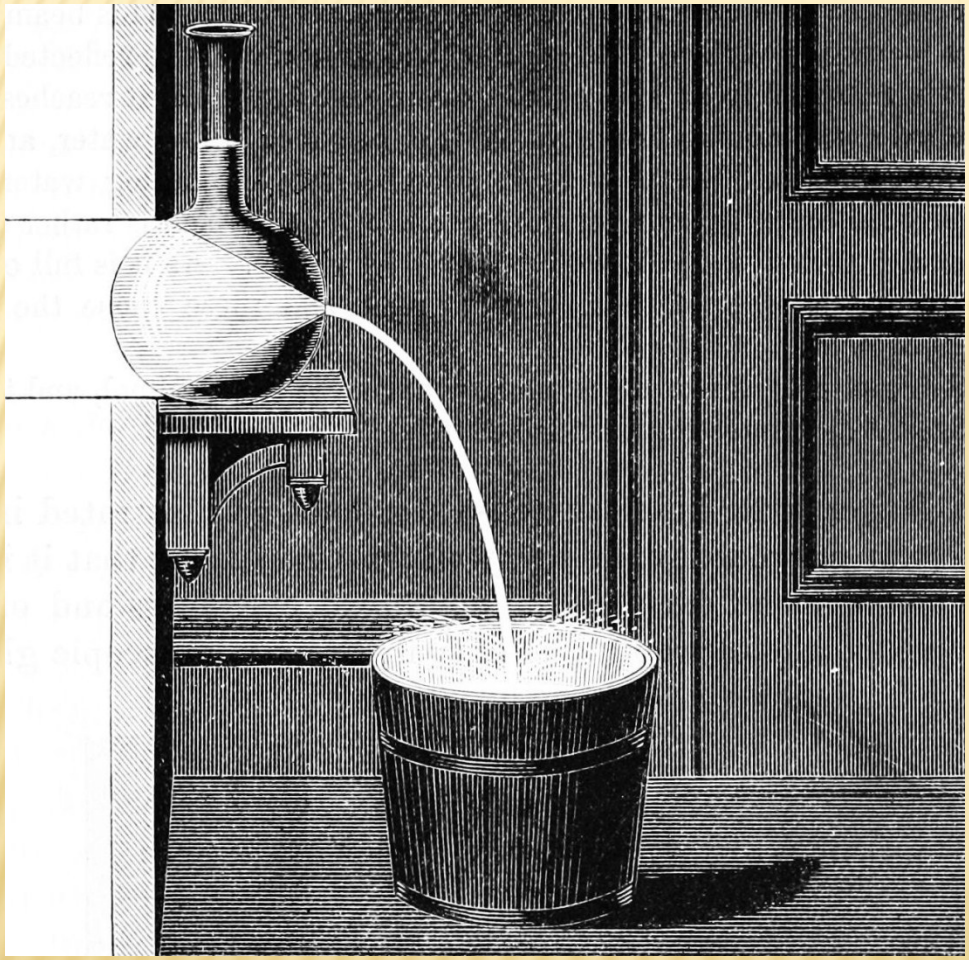
For further readings: (in Czech):

MARŠÁLEK, Leoš. Optická vlákna : verze 2.1.3 . Technická univerzita Ostrava (available online)

OPTICAL FIBRE - DEFINITION

- Optical fibre is waveguide in the optical signals frequency domains.
- Optical fibre works on the principle of Total Reflection (internal)
- Optical fibre is usually thin rod of transparent material (glasses, plastics) – core – surrounded by cladding material with lower refraction index + mechanical sheath.

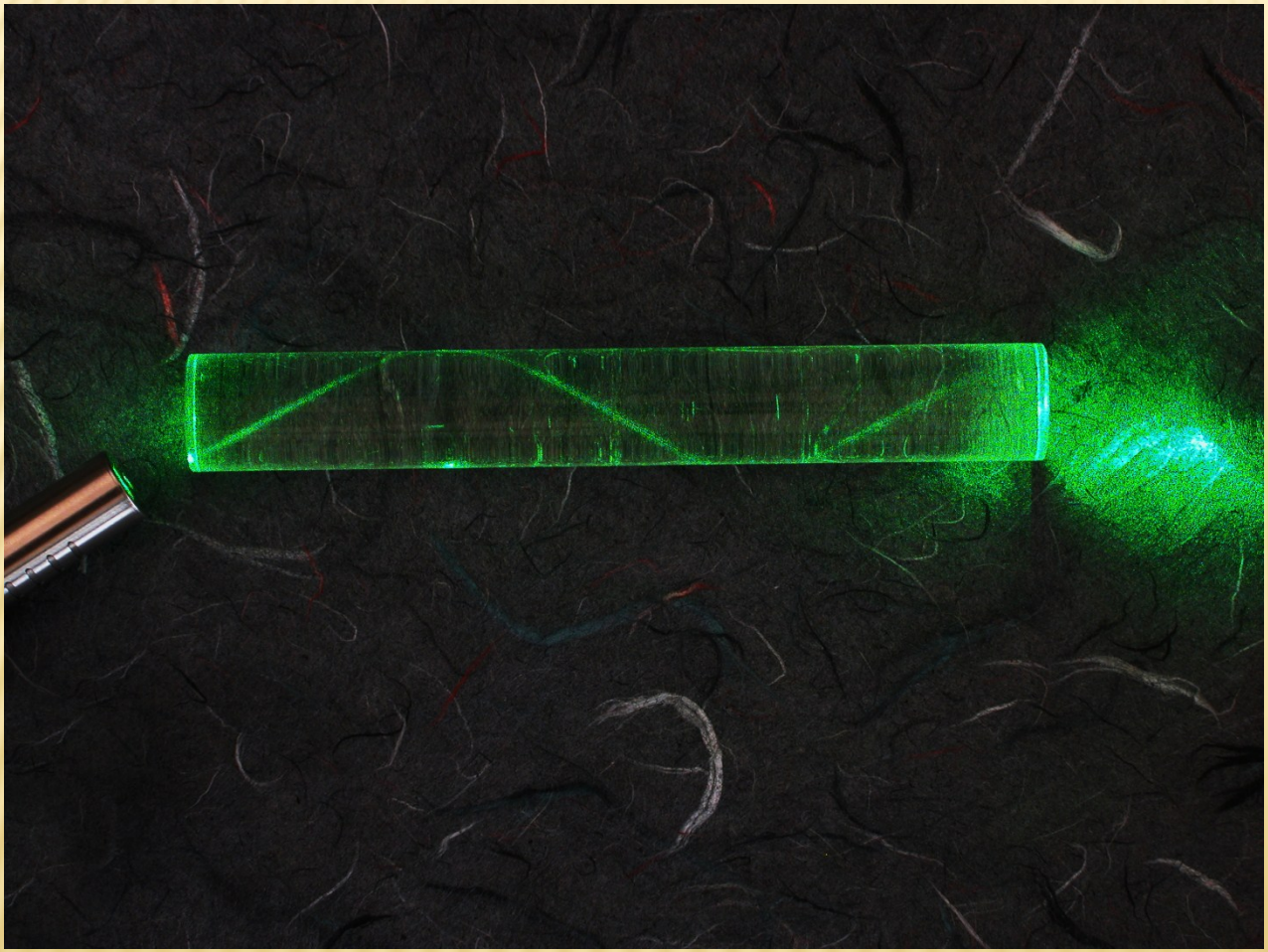
OPTICAL FIBRE – EARLY BEGINNINGS



Popular Science Monthly Volume 11
1877

The very basic light guide :o)

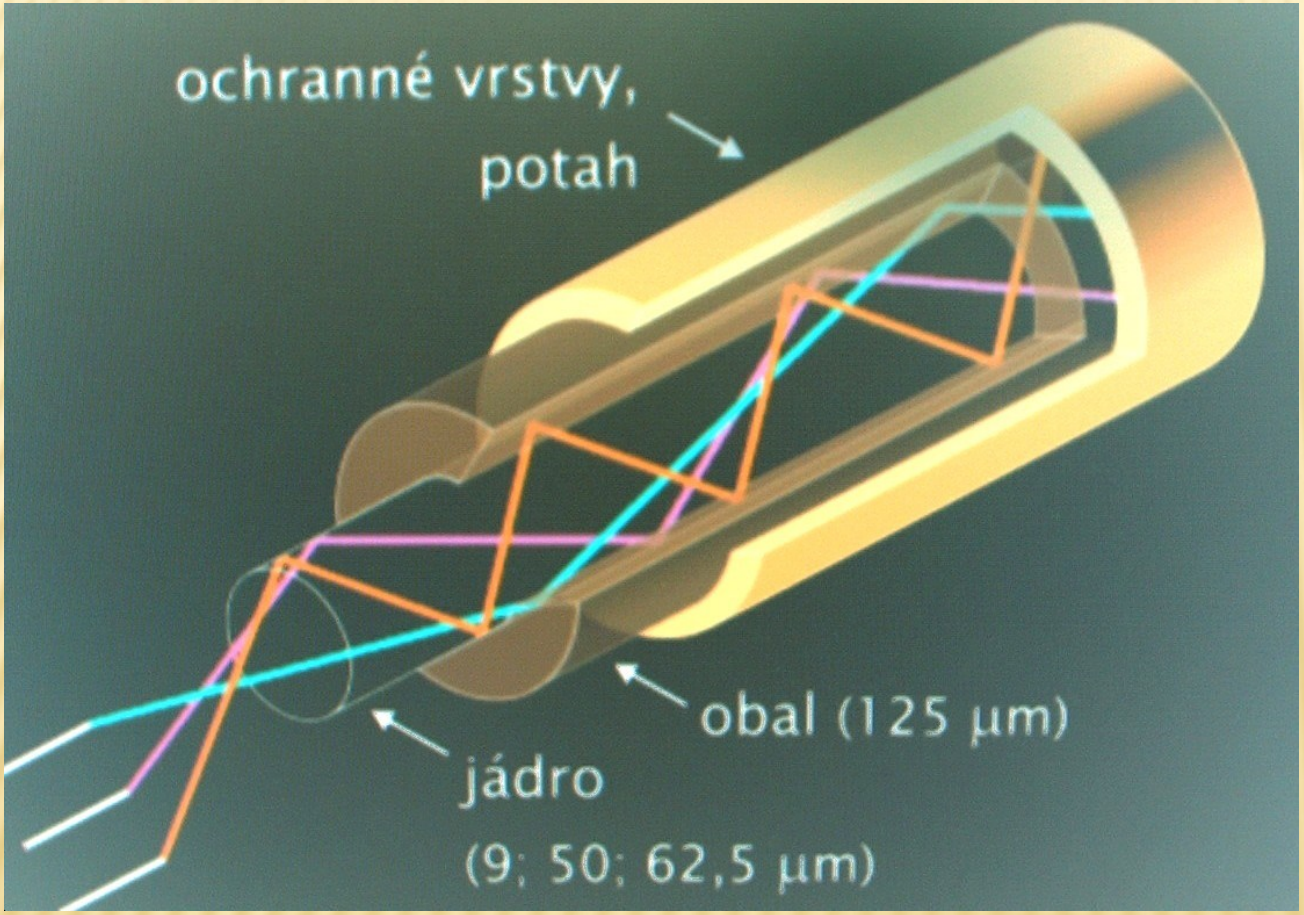
OPTICAL FIBRE – TOTAL REFLECTION



Total reflection of laser in multimode fibre.

Timwether: http://commons.wikimedia.org/wiki/File:Laser_in_fibre.jpg

OPTICAL FIBRE – CONSTRUCTION



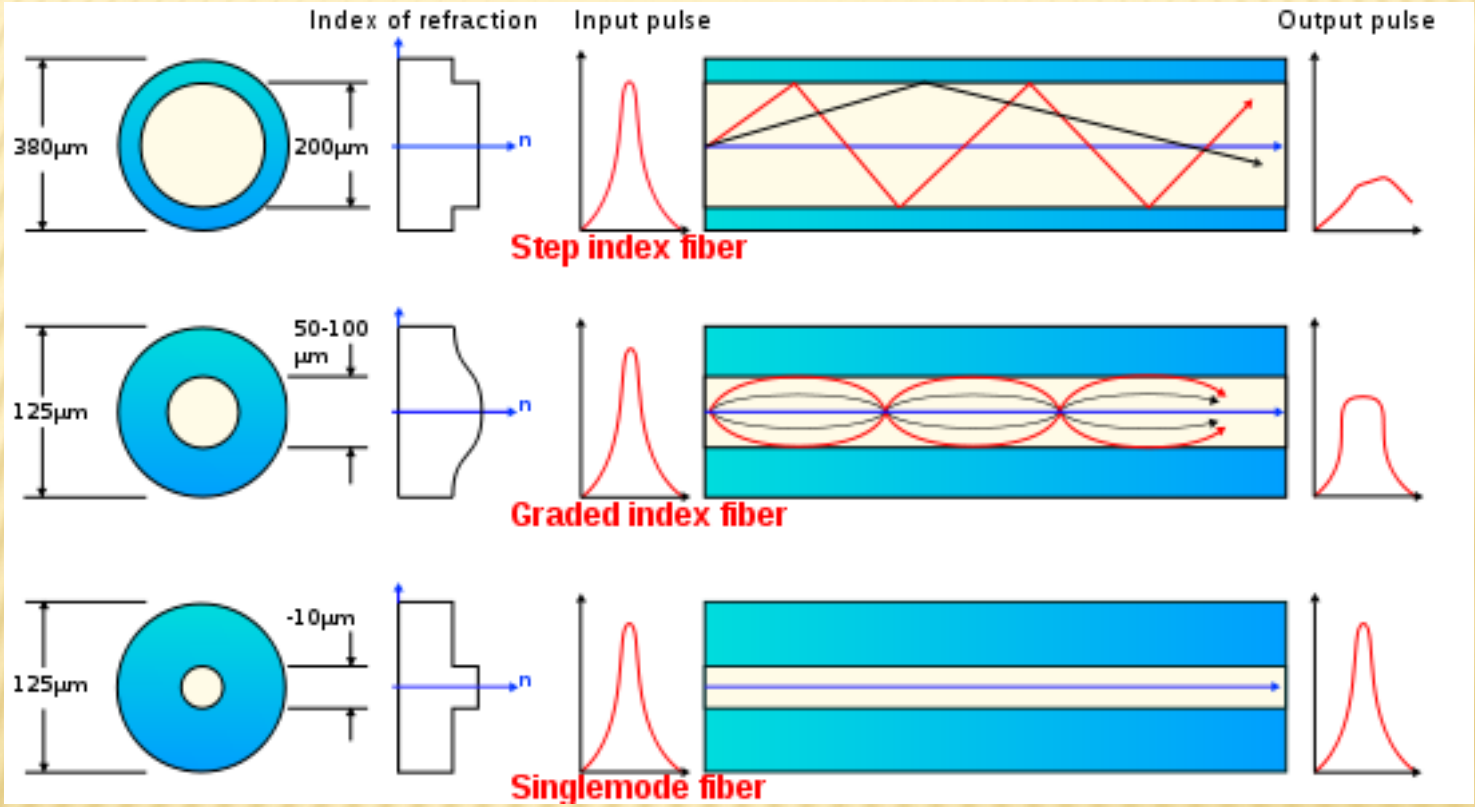
Core

Cladding

Shielding

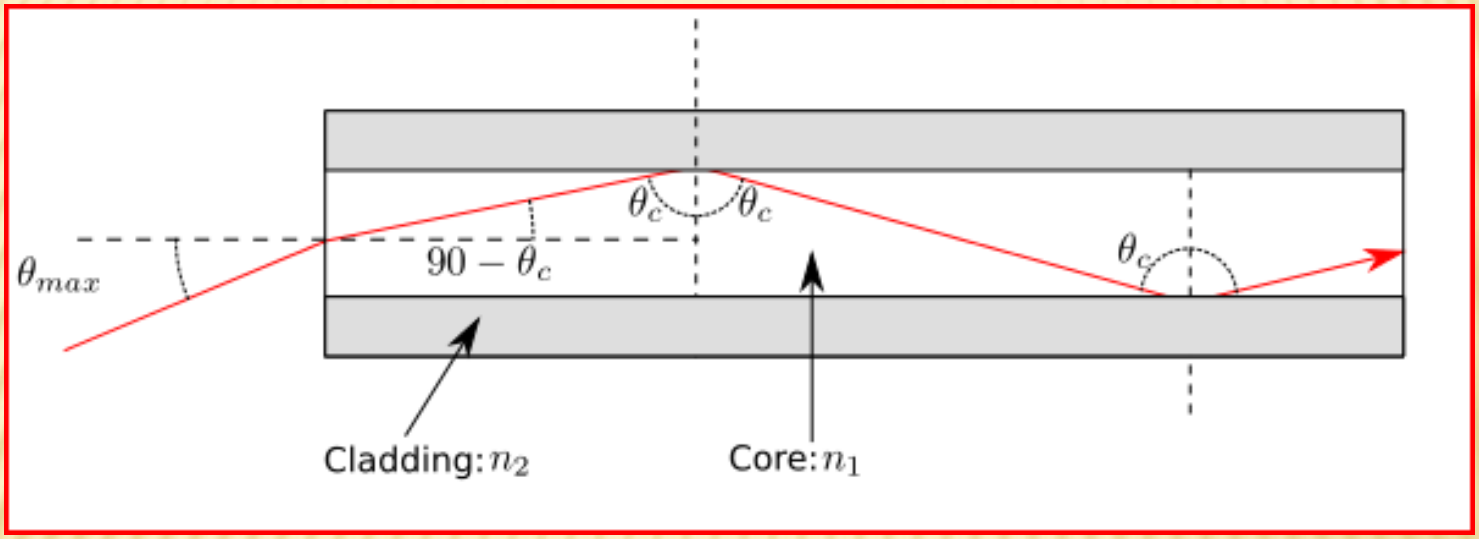
Ryj: http://commons.wikimedia.org/wiki/File:Quarzfaser.jpg

OPTICAL FIBRE – CONSTRUCTION II



Mrzeon: http://en.wikipedia.org/wiki/File:Optical_fiber_types.svg

OPTICAL FIBRE – NUMERICAL APERTURE

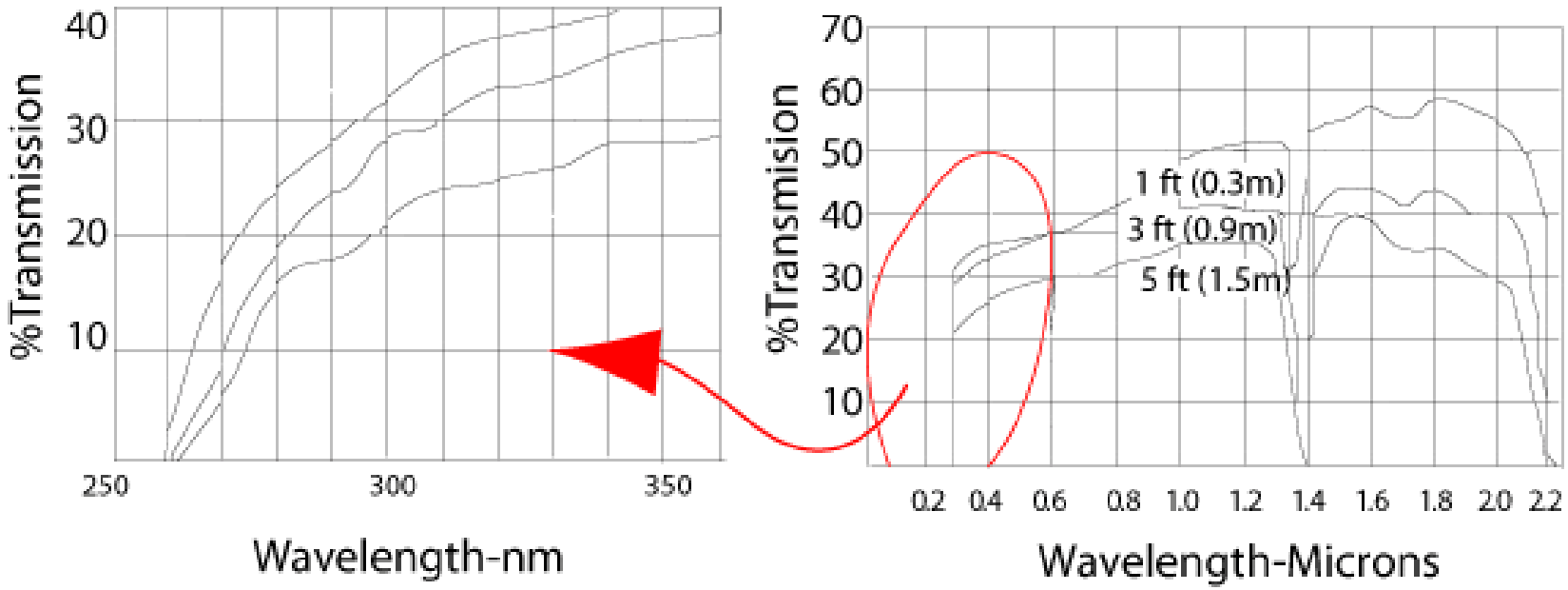


User A1 at en.wikipedia: http://en.wikipedia.org/wiki/File:Optic_fibre-numerical_aperture_diagram.svg

Acceptance cone, depends on refractive index of core vs. cladding.

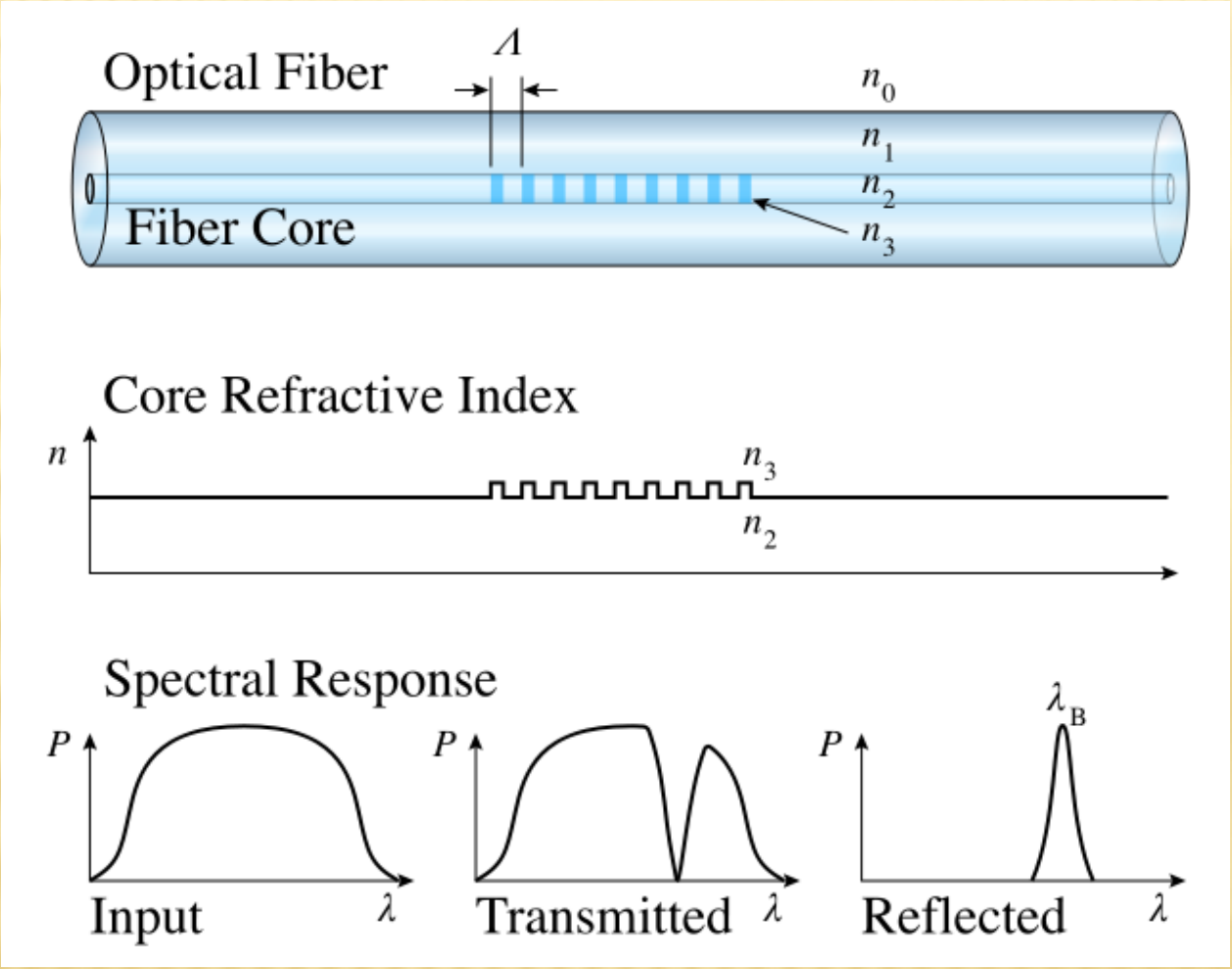
$$n\sin(\Theta_{\max}) = \sqrt{n_1^2 - n_2^2} = \mathrm{NA}$$

OPTICAL FIBRE – ATTENUATION



Characteristic spectral response of quartz optical fibre optics light guides taken from Edmund Optics online catalogue:
http://www.edmundoptics.com/onlinecatalog/displayproduct.cfm?productid=1858

OPTICAL FIBRE – UNCOMMON USAGE



Fibre Bragg Grating

Sakurambo: http://en.wikipedia.org/wiki/File:Fiber_Bragg_Grating-en.svg

Thank You for Your attention! :o)