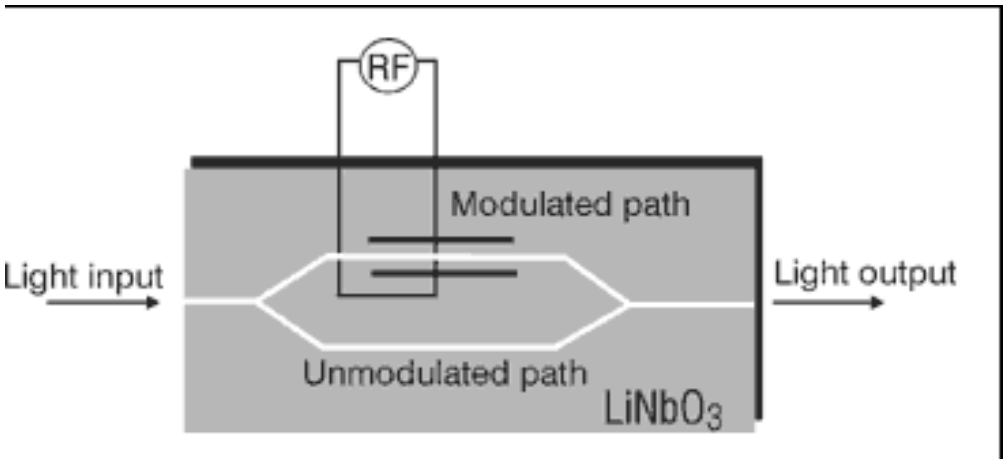
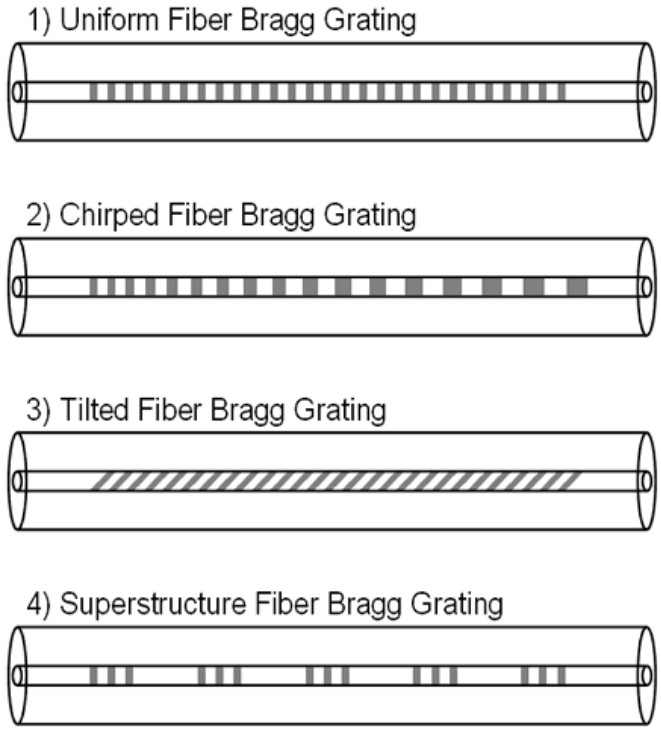
RF-to-Optical Conversion



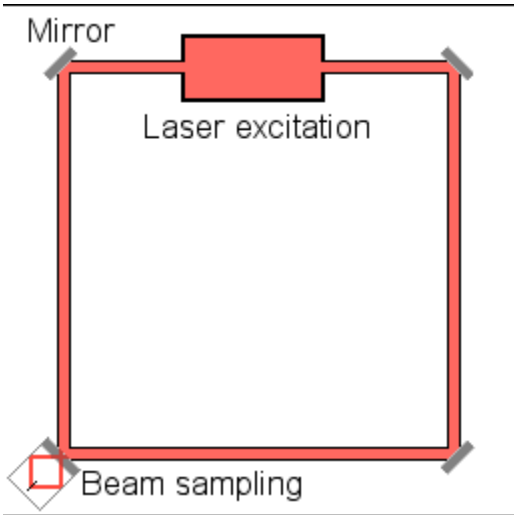
- Fibres in avionic systems: reduce weight, decrease EMI and hence improve SNR, improve bandwidth.
- Refractive index depends on bias, hence changes phase between two beams
- Depending on bias we get constructive or destructive interference
- Bias is produced from RF signal received by antenna (after going through amplification)
- Optical beam is then modulated according to input RF signal
- Optical signal can then be coupled to a fibre

Fibre Bragg Grating (FBG)



- FBG is a fibre with a core that has a repetitive change in refractive index.
- Can be a uniform periodic change, or non-uniform.
- Response of fibre is very sensitive to changes in spacing.
- Any tiny change caused by mechanical stress, pressure, vibration or temperature will be detected.
- FBGs are ideal as sensors in avionic systems.

Ring Laser Gyroscope (RLG)



- Beam is split into two 360 degree paths
- One beam is counterclockwise, one clockwise
- The two interfere
- Relative phase between beams is dependent on angular velocity
- This is called the Saganac effect
- By measuring the relative phase between the beams we can determine angular velocity

Fibre Optic Gyroscope (FOG)

- Same principle as RLG, except beams are guide by fibre
- Greater mechanical robustness
- Saganac effect is proportional to number of turns in fibre loop
- FOG is used in high performance aerospace systems