



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



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WINTER COLLEGE ON
LASER PHYSICS: SEMICONDUCTOR LASERS
AND INTEGRATED OPTICS

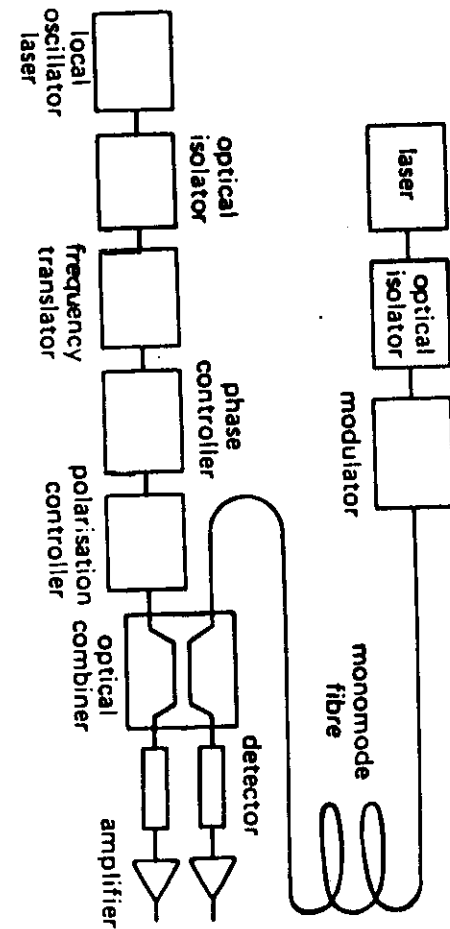
(22 February - 11 March 1988)

INTEGRATED OPTICAL CIRCUITS

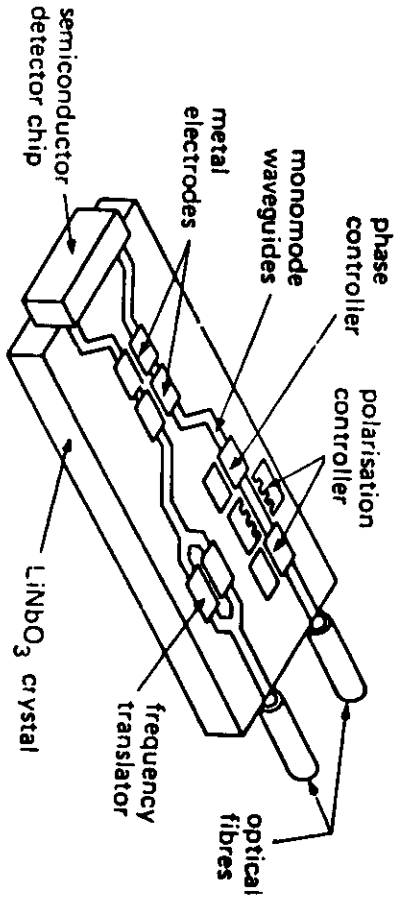
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INTEGRATED OPTICAL CIRCUITS

- 1) COHERENT RECEIVER DEVICE
- 2) MULTIPLEXER / DEMULTIPLEXER
- 3) GYRO-CHIP
- 4) RF-SPECTRUM ANALYZER
- 5) DOPPLER-VELOCIMETER
- 6) MATRIX-VECTOR MULTIPLICATION
- 7) DISPLACEMENT SENSOR
- 8) DISC PICKUP DEVICE
- 9) PRINTER HEAD

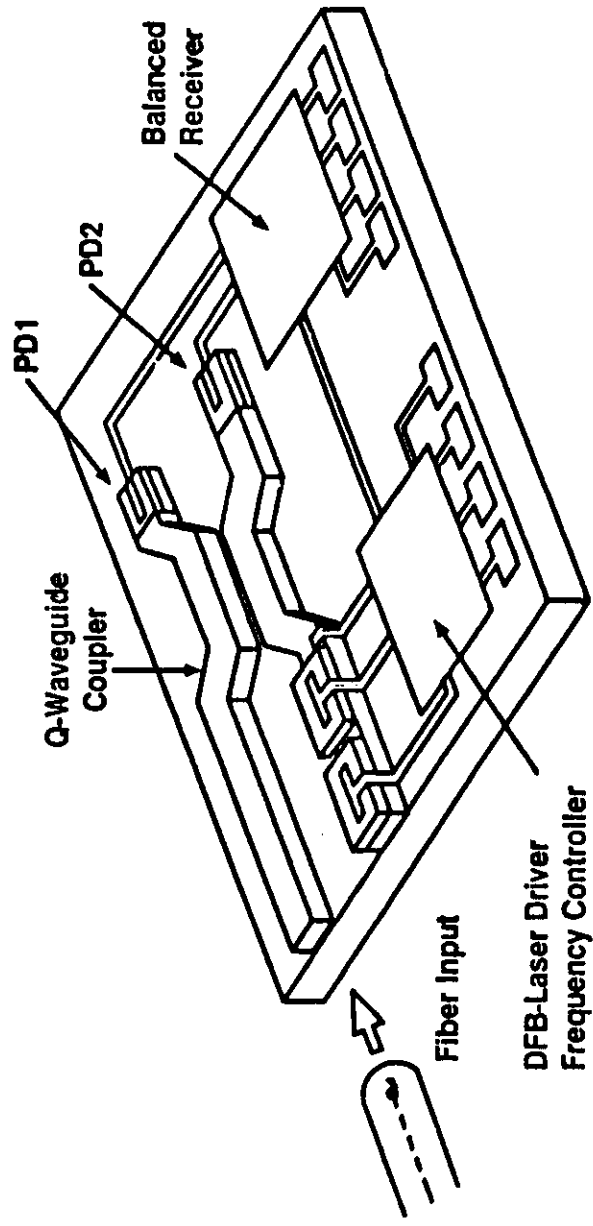


Typical coherent optical fibre system
(RC Booth : 100C '85)



Integrated optical coherent receiver device
(R.C.Booth et al., IOOC '85)

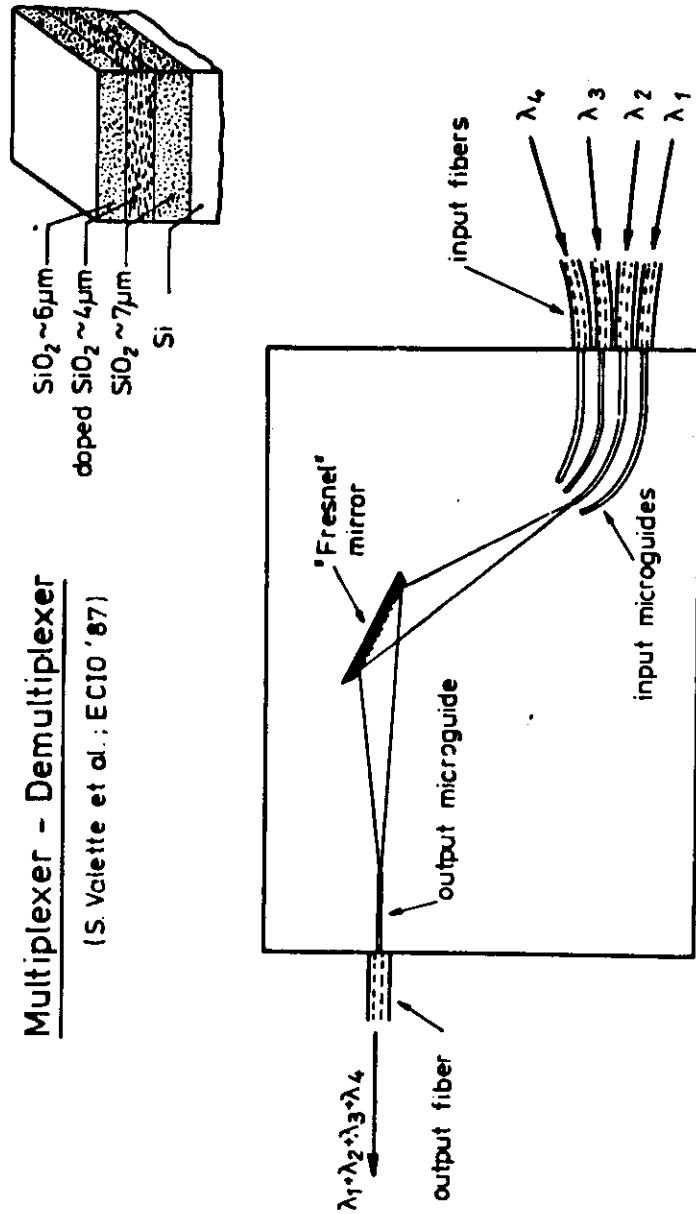
Integrated Coherent Optical Receiver



nad Leheny (Bell), 1987

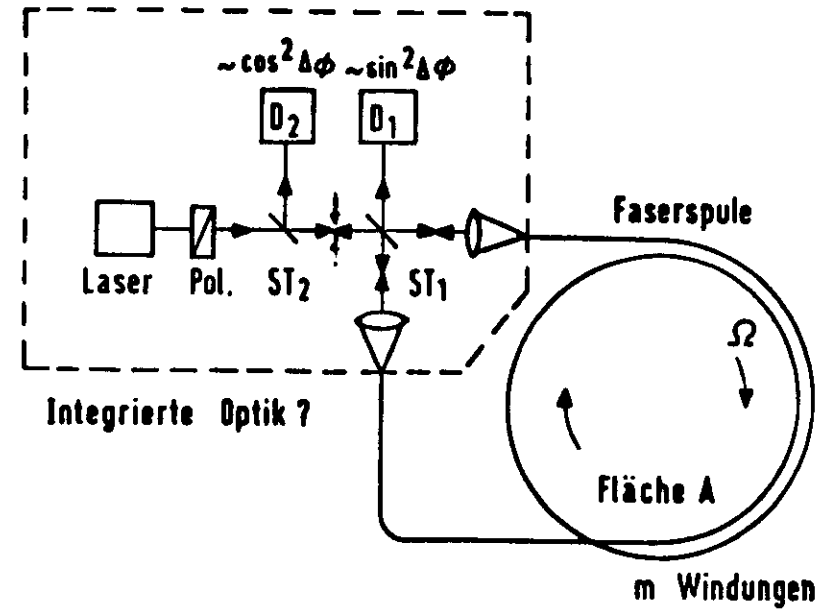
Multiplexer - Demultiplexer

(S. Valette et al.; ECIO '87)



Beispiel: SAGNAC - INTERFEROMETER

Prinzipbild:



relativistischer Sagnac - Effekt:

$$\Delta \phi = \frac{4\pi m A}{\lambda_0 c} \Omega$$

Integrated optical "gyro-chip"

(Lefèvre et al.; 1985)

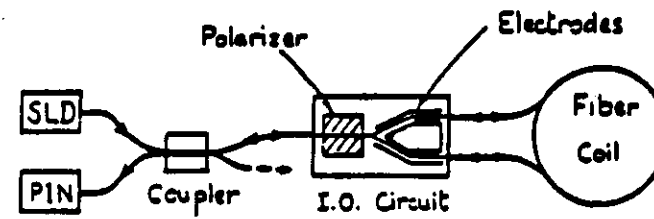
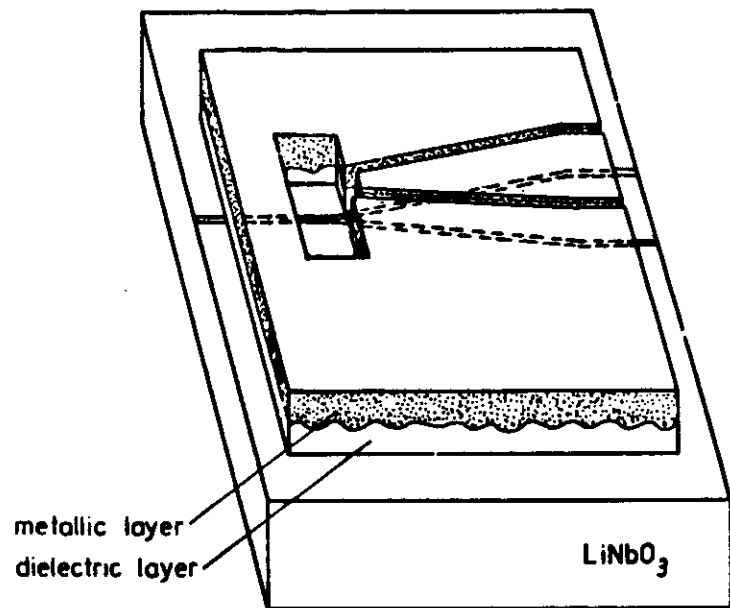


Figure 1-b
Operating schematic of the fiber gyro

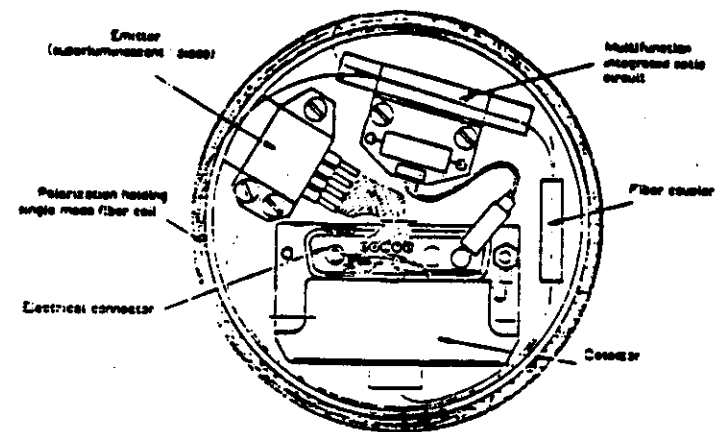
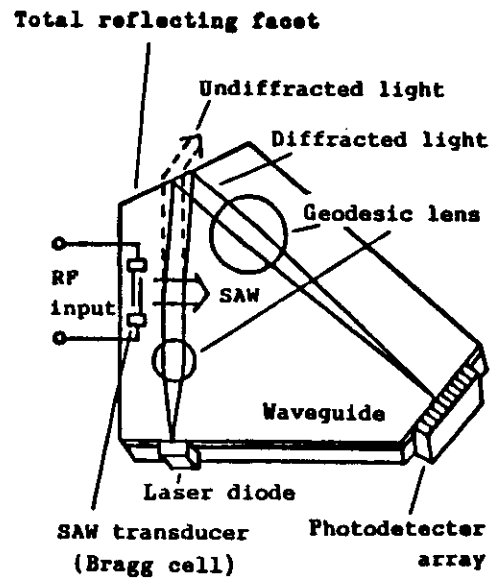


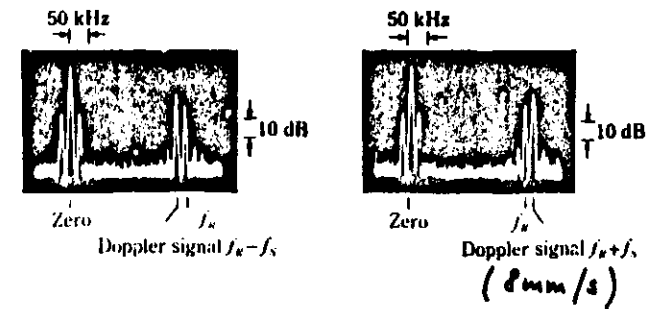
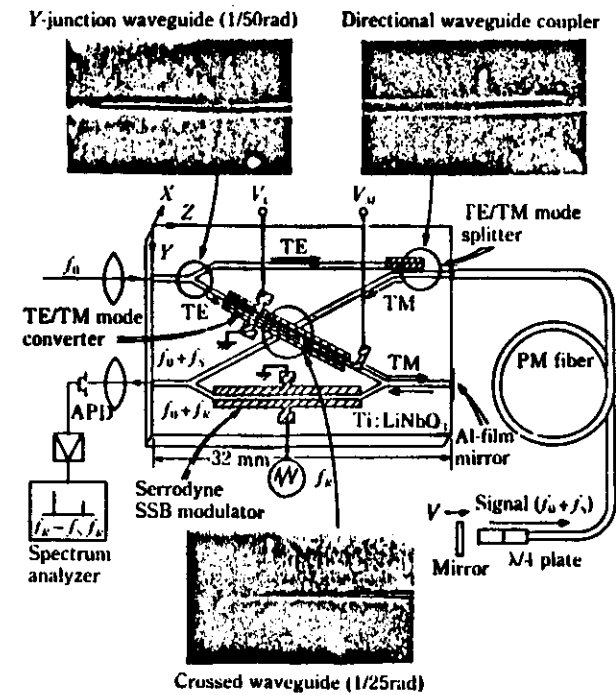
Figure 1-c
Actual configuration of a quarter of a liter fiber gyro cross-board

Integrated optical spectrum analyzer

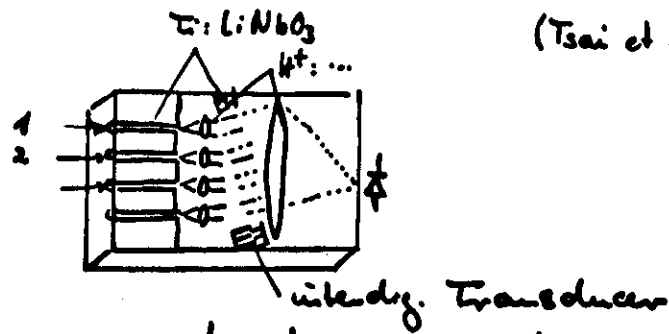
(H. Nishimoto + T. Kitano ; ECIO '87)



Integrierte Optik für Doppler-Velocimetrie:
(nach Nishikawa et al. 1987)



- Int. opt. Matrix-Vektor (bzw. Matrix) Multiplikation (e/o und o/e).

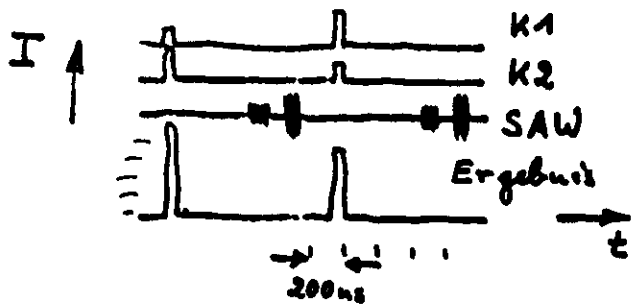


(Tsai et al.)

Beispiel:

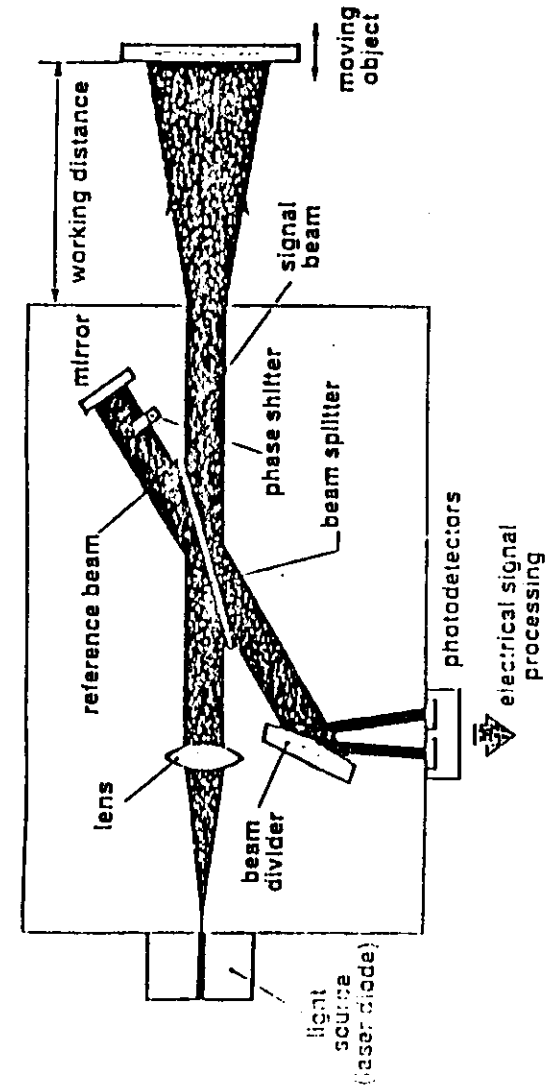
$$\begin{matrix} \downarrow & \downarrow & \downarrow & \downarrow \\ \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix} & \begin{pmatrix} 1 \\ 2 \end{pmatrix} & = & \begin{pmatrix} 5 \\ 4 \end{pmatrix} \\ \downarrow & \downarrow & & \downarrow \\ \text{Kanal 1} & \text{Kanal 2} & \text{SAW} & \end{matrix}$$

Resultat:



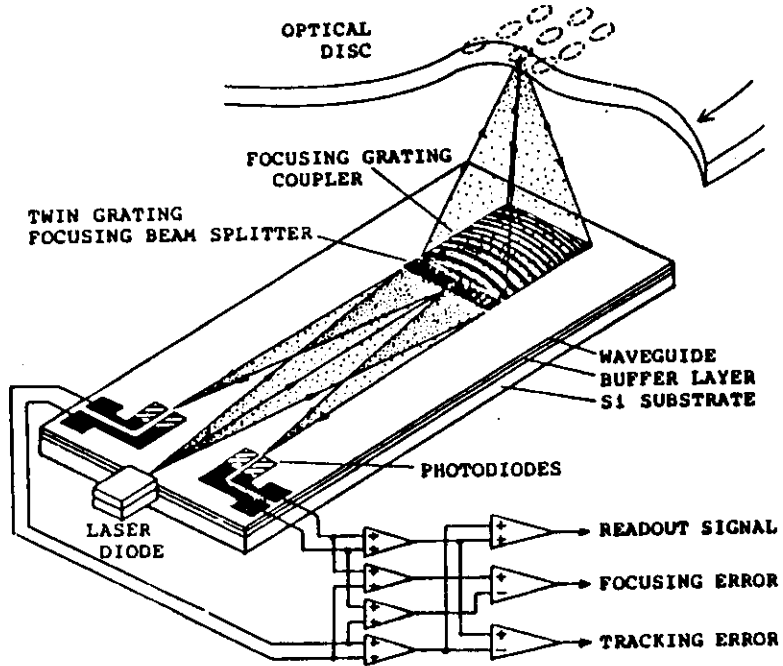
Integrated optical displacement sensor

(J. Lizet et al.; ECIO '87)



Integrated optical disc pickup device

(N.Nishihara + T.Suhara : IOOC '85)



Integrated optical printer head

(T.Suhara et al.: ECIO '87)

