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Winter College on Fibre Optics, Fibre Lasers and Sensors

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FBG-Based Sensors

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F P	BG F	abricati	on: echanis	sms	
	With	out Hydrog	en		Hydrogen Loaded
Pos cha	itive index nge (Type I)	Negative index change (Type II a)	Core-clado interface d (Type II)	ding lamage	Positive index change, OH group formation
	Index c	hange: 10 ⁻⁴ -	·10 ⁻³	Ind	ex change: up to 10 ⁻²
(N	lonlinear dep	endence of index or	n fluence)	(Linear	dependence of index on fluence)
	Oxygen de structural	eficient defect-rela transformation of	ated glass		Photochemical reaction of hydrogen with Ge-O
	Writing wav also 193 n	velengths: 240 nm m	n, 330 nm,	W	riting wavelength: <310 nm (the shorter the better)
	Introduces with polariz	birefringence whe zation across the f	en writing fiber	R W	equires hydrogen outgassing hich changes index by ~10- ³
4 F			25		After D. Starodubov ICTP Winter College FBC Sensors ShortCourse A. Mendez



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TYPES	CHARACTERISTICS			
Simple FBG	Uniform grating spacing—meets Bragg condition			
_PG	Longer grating periods—couples light into cladding			
Chirped FBG	A tapered or graded grating period—reflects multiple wavelengths			
Tilted FBG	Gratings written at an angle to the fiber axis			













































































































































Recommended Bibliography

Applications of Fiber Optic Sensors in Engineering Mechanics Edited by Farhad Ansari, American Society of Civil Engineers, 1993. ISBN 0-87262-895-7. 230 pp.

Fiber Optic Smart Structures Edited by Eric Udd, John Wiley & Sons Inc., 1995. ISBN 0-471-55448-0 671 pp.

Smart Structures and Materials Brain Culshaw, Artech House, 1996. ISBN 0-89006-681-7. 207 pp.

Structural Monitoring with Fiber Optic Technology Raymond M. Measures, Academic Press, 2001. ISBN 0-12-487430-4. 716 pp.



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