The fiber summary

Liping Wang Ye Tian
Shandong University
Aug.1th ,2019

- Fiber in SDU

Type	BCF91A	Y-11(200)	BCF98S
Manufacturers	Saint-Gobain	From Xiaochao	Saint-Gobain
Length	3 km	82 m	400 m
Cladding thickness	Single cladding	Multi cladding	Single cladding
Emission color	Green	Green	/
Emission peak	494 nm	476 nm	/
$\frac{1}{e}$ length	>3.5 m	>3.5 m	/
Characteristics	Shifts blue to green	Shifts blue to green	Clear waveguide
Core refractive index	1.60	1.59	1.60
Inner cladding refractive index	1.49	1.49	1.49
Outer cladding refractive index	/	1.42	/

The emission peak Y11 is 476 and BCF91A is 494. Since PMT's sensitive peak value is about 420, Y11 has advantage in emission peak.

SDU #6

Materials:

Fiber	Y11(62m)
Fiber end reflector	MSR
Scintillator	Kedi improved
Lead	Ordinary lead made in China
Layer reflector	Powder painting (thickness of each layer:70um)
Coating	Glue+TiO_2

Main purpose to test the reflectivity of new fiber end reflector. All process will be made in SDU

Fiber test plan

Fiber WLS-clear connector light loss test:

WLS fiber	Clear fiber
BCF91A-SC	BCF98-SC
Y11(200)-MC	BCF98-SC
BFC91A-MC(lack in SDU)	BCF98-SC
BCF91A-SC	BCF98-MC(lack in SDU)
BFC91A-MC(lack in SDU)	BCF98-MC(lack in SDU)
Y11(200)-MC	BCF98-MC(lack in SDU)

Note : 6 combinations, only two combinations could be performed in SDU

Multi-cladding fiber(MC) has higher light yield than single cladding fiber(SC) because of large trapping efficiency

Comparison of BCF91A-MC to Y11

Type	BCF91A-MC	Y11
Core material	Polystyrene	Polystyrene
Core refractive index	1.60	1.59
Inner cladding material	Acrylic	Polymethylmethacrylate
Inner cladding refractive index	1.49	1.49
Outer cladding material	Fluor-acrylic	Fluorinated polymer
Outer cladding refractive index	1.42	1.42

Y11 and BCF91A have same(similar) refractivity

SDU contracted to Saint-Gobain company in US to buy BCF91A-MC, but get no reply. Influenced by Trade war between China and the US, other group that in detector production couldn't receive new fibers from Chinese vender. Contract Chinese vender to ask if they have sample of both BCF91A-MC and BCF98-MC left, otherwise we need sample bought from US side.

Next step

- BCF91A-SC to BCF98-SC
  New samples will be polished in SDU, and will be retested to decrease light loss
- Y11(200)-MC to BCF98-SC will be tested in SDU
- Light yield of WLS fiber comparison
- Fiber polishing quality test
- Plan to build SDU#6

THANK YOU