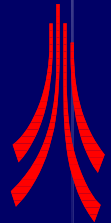


# Fibre Ribbon QA (update)

Tim Brodbeck, Gareth Hughes

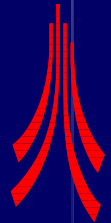
`t.brodbeck@lancaster.ac.uk`

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# Status as of 30/08/2005

- Ribbons for 1C and 4C-9C all tested
- Ribbons for 4A-9A tested (1A in use in NIKHEF, lengths will be checked there)
- Last production tests 4A straights (17/06/05) and 4A-Y (20/06/05)
- Now waiting for delivery of Infineon shells from Oxford (200 needed)
- More machined Zirconia pins (290) delivered 05/07/05
- Essentially no change to the situation reported in June
- Ribbons for 2C, 3C, 2A, 3A and Spares in Lancaster.
- Length and Attenuation checks have been completed on Spares

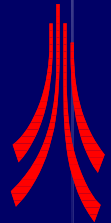


# Fibre QA

ATL-IS-ES-0098 gives the QA requirements for the fibre ribbons:

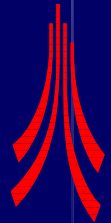
- Length
  - Length tolerance is  $\pm 10$  mm
  - except on spare ribbons -0 mm to +100 mm
- Insertion Loss
  - *Insertion Loss should be less than 4 dB without optical grease on the MT12*

The insertion loss requirement is interpreted as 2 dB per fibre per MT12 connection.



# Attenuation Measurement

- Have measured 255 Straight and 136 Y ribbons
- Each S measurement involves about 2 MT12-MT12 matings on the reflector ribbon
  - The wear on the locating holes in the reflector's MT12 increased the apparent insertion loss from 7 dB to 14 dB
  - Spec says  $< 12 \times 2$  dB
- Have now a new light source, at least 12 dB brighter
- Also new *Oxford Box* constructed with SIMM rather than GRIN fibre. Lowers losses.
- New SIMM reflectors.



# Attenuation Parametrisation - Valencia Apr '05

- From a series of measurements made on various combinations of S (or N), Y, reflector and loop ribbons conclude attenuation depends on

- $n_{12}$  the number of MT12 connections
- $n_6$  the number of MT8 connectors with 6 fibres
- $l$  the length of fibre ribbon

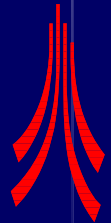
- Model measured signal as

$$\alpha_{Pred} = a_0 + a_1 \times l(\text{metres}) + a_2 \times n_{12} + a_2/2 \times n_6$$

- $a_0$  contains basic source strength etc, 33.4 dB fitted
- $a_1$  is the ribbon attenuation, 0.18 dB/m, 12 passes.
- $a_2$  is the attenuation per MT12 connection, an MT8(6) is counted as  $0.5 \times a_2$ ,  $a_2 = 8.2$  dB fitted.
- These fitted parameters come from a series of special measurements not from routine QA measurements
- (Note 30/08/05: These measurements made before wear on reflector MT12 became serious)

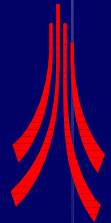
# Student Project July/August 2005

- New, more intense, light source and more efficient Oxford Box permit repeat of measurements but this time with Optical Grease in the MT12 junctions
- Range of measurements taken with up to 7 MT12 junctions
  - ...and up to 16 m of ribbon length
- Same fit as presented in Valencia yields
  - $a_0$  contains basic source strength etc,  $8.11 \pm 0.51$  dB fitted
  - $a_1$  is the ribbon length attenuation,  $0.44 \pm 0.09$  dB/m, 12 passes.
  - $a_2$  is the MT12 junction loss;  $a_2 = 1.84 \pm 0.26$  dB fitted.
- Fixing  $a_1$  at 0.18 dB/m gives  $a_2 = 2.45 \pm 0.14$  dB
  - ...done to minimise effect of cladding light



# Effect of Optical Grease

- Comparison of the measurements presented at Valencia and those of the Student Project suggest:
  - $a_2$  is 8.11 dB dry and 2.45 dB with grease.
  - Difference is  $5.66 \pm 0.52$  dB
  - Flick (Wuppertal) found  $\Delta = 4.32$  dB
- Detailed measurements on a few MT12 junctions, with and without grease suggest  $\Delta = 3.6$  dB with a greater uncertainty than the published Flick data.
- We do not propose to pursue these measurements any further



# Actions from June 2005 Meeting

- Fibre Components : mass (Status - ongoing)
- Material database entries (ongoing)
- Method for optical grease removal inside Infineon coupler. Investigated by TJB and Ian Mercer. Successful recipe found.
- Mappings for PPF0 and PPF1 completed

