

# On Integral Field Spectroscopy with Subaru

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I. Iwata (Subaru Telescope)

# Integral Field Spectroscopy (IFS)

## Integral Field Unit (IFU)

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- So far, only Kyoto 3DII has achieved IFS with Subaru.
- To maximize the observing efficiency (to extract information as much as possible), IFS is a Key Observing Technique.

# Candidates of IFU

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- FOCAS IFU
  - Image Slicer Unit, 28 Slices, 12" x 8.4"
  - PI: S. Ozaki (ATC, NAOJ)
  - see Proceedings of Future Instrument WS in Jan. 2011
- MOIRCS Upgrade
  - Pick-off Mirror + Fiber, 2 IFUs
  - Kakenhi Kiban(S): 4 Years from 2011, PI: N. Arimoto (Mitaka)
- SuFAIFS: Flexibly Addressable IFS
  - Focal plane micro-lens array + Switcher
  - PI: N. Tamura (Subaru)
  - see Proceedings of Future Instrument WS in Jan. 2011

# 田村直之さんから

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- すばるは遅れて面分光に参入することになる。サイエンス、仕様をよく考える必要
- $z > 1$ を(遅れて)やるのか、 $0 < z < 1$ で面白いテーマを探すのか
- 新規装置開発には新しい要素を含むべき
  - ハワイ観測所が面白いことに取り組んでいる、と認知してもらいたい
- 実現可能性が高そうなものを、仕様をサイエンスに合わせて修正すること、観測所のリソースをうまく集約すること(個人の自由度を残しつつ)

# OH Suppression Fiber in University of Sydney

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Hattori, T., Iwata, I. (Subaru Telescope)

# Astrophotonics incl. OH Suppression Fiber in Univ. Sydney

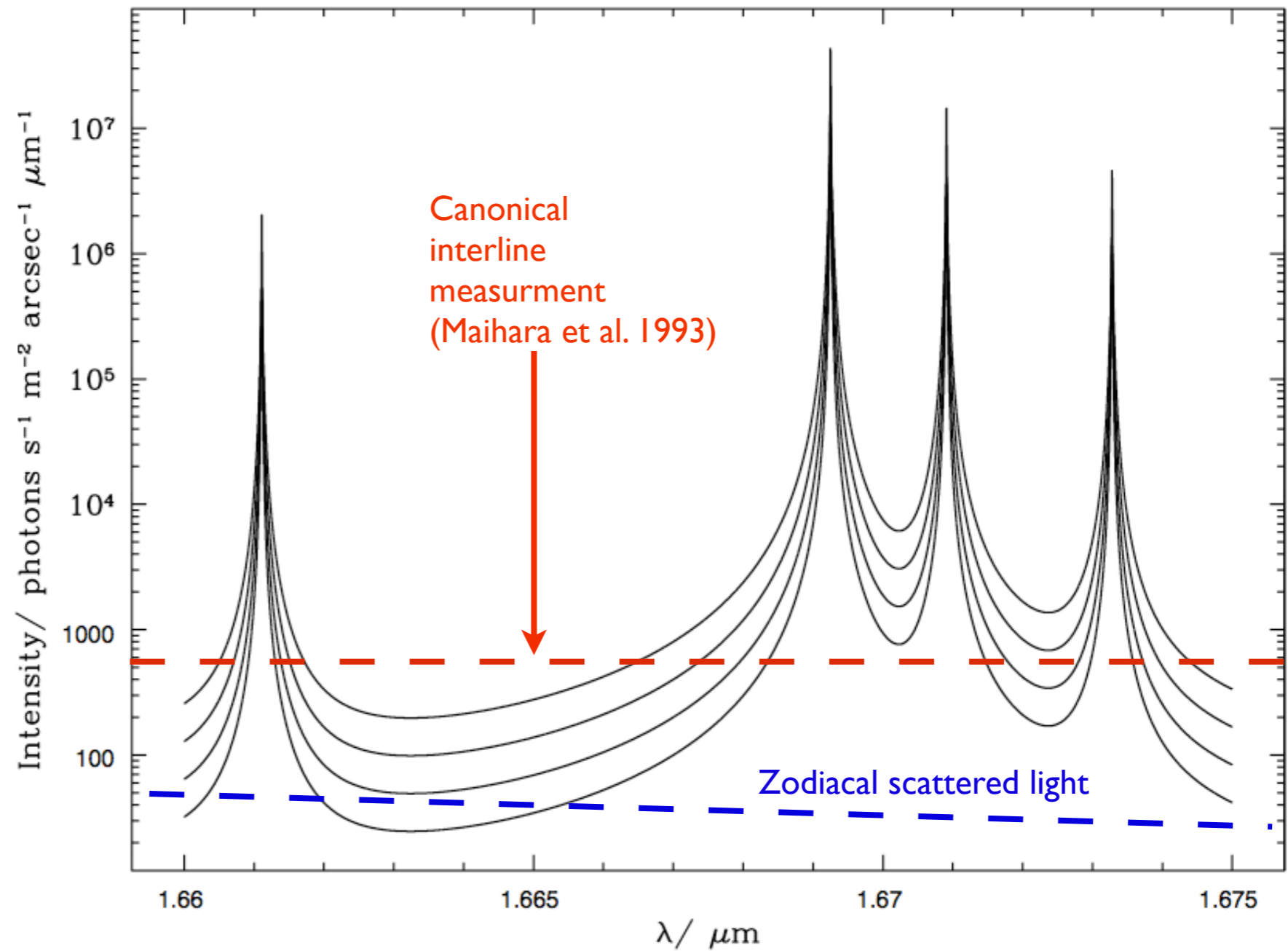
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- Hattori, T. and Iwata visited Prof. Joss Blad-Hawthorn in Feb. 2011
- A report by Hattori san is available at <http://www1.subaru.nao.ac.jp/~hattori/sydney201102/> (in Japanese with much of photos)
- Joss is willing to collaborate with Subaru. One possibility is to build a test unit of 'multi-core' fiber with FBG (OHS at a part of H-band).

# Scattering

$$Y_{\text{fit}} = \frac{\omega^2}{(\lambda - \lambda_0)^2 + \omega^2} + A_B,$$

$$\omega = \frac{\lambda_0}{N\pi\sqrt{2}}.$$

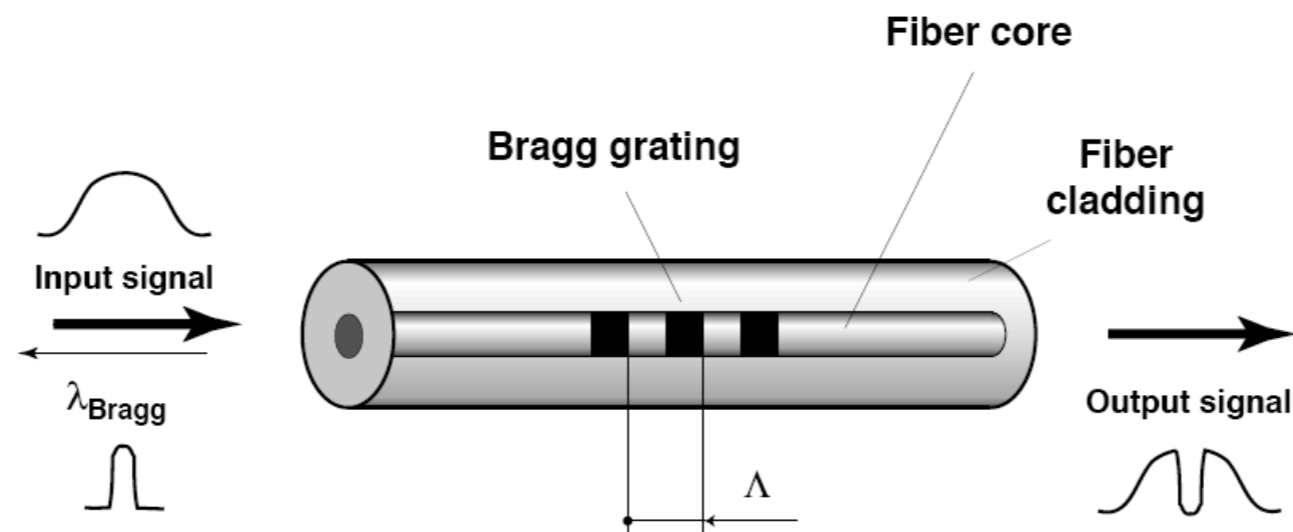


U. Hawaii 2.2m Coudé spectrograph.  
600 lines mm<sup>-1</sup> B&L grating

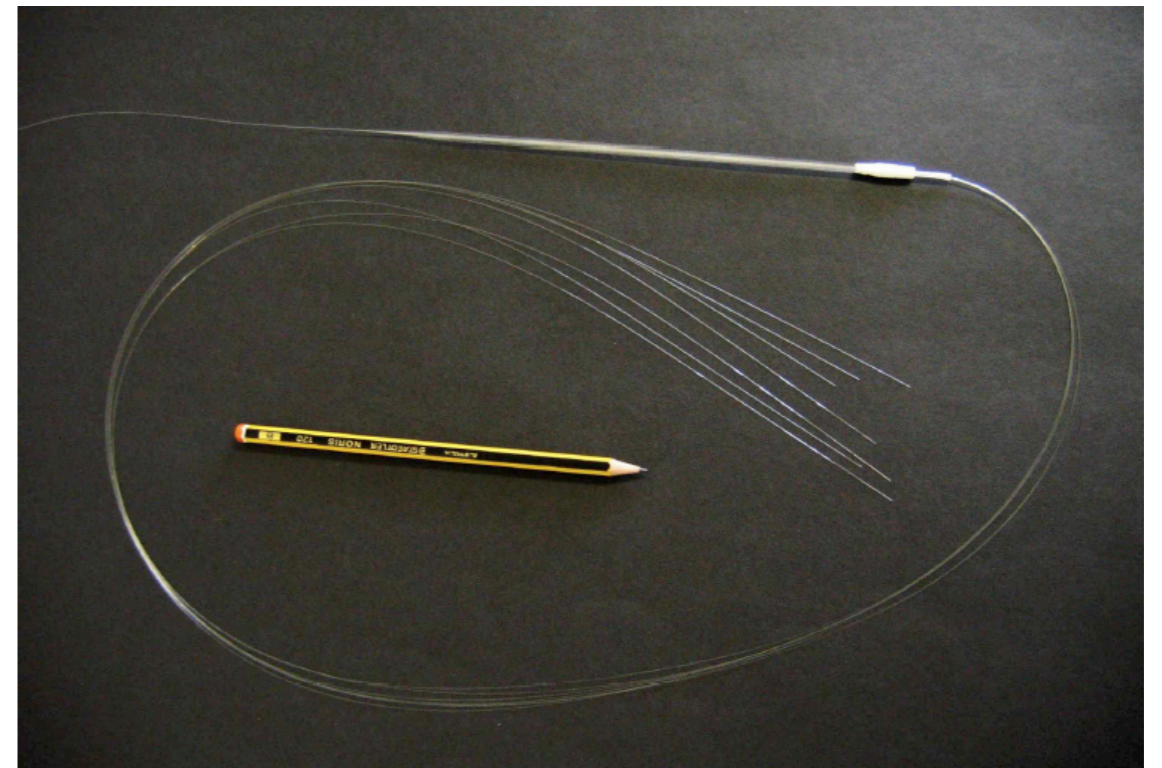
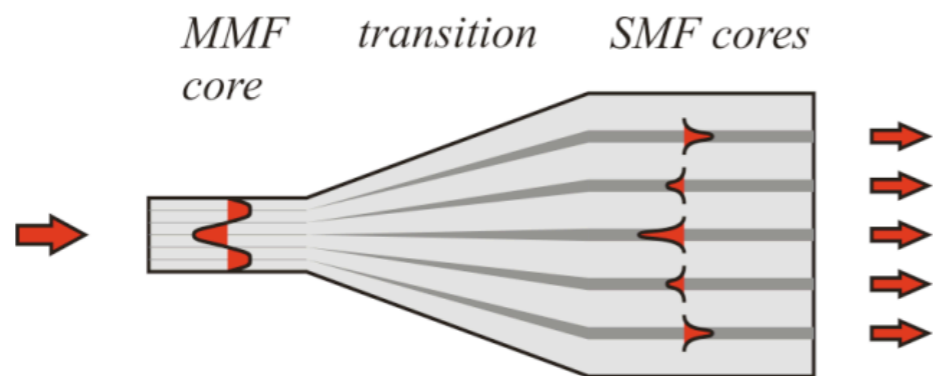
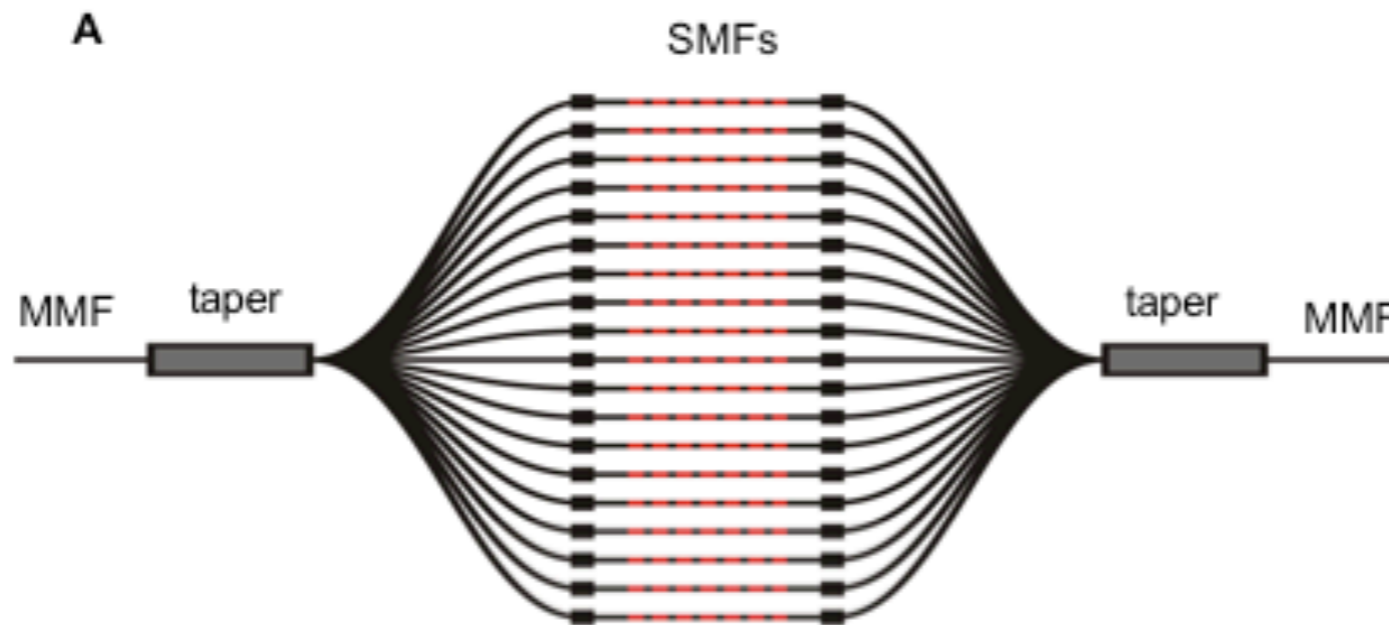
Woods et al. 1994

# Fibre Bragg Gratings

- Optical fibres with a periodic variation in refractive index
  - Fresnel reflections at each boundary
  - Small, *but* in phase
- ⇒ high reflection at a single wavelength

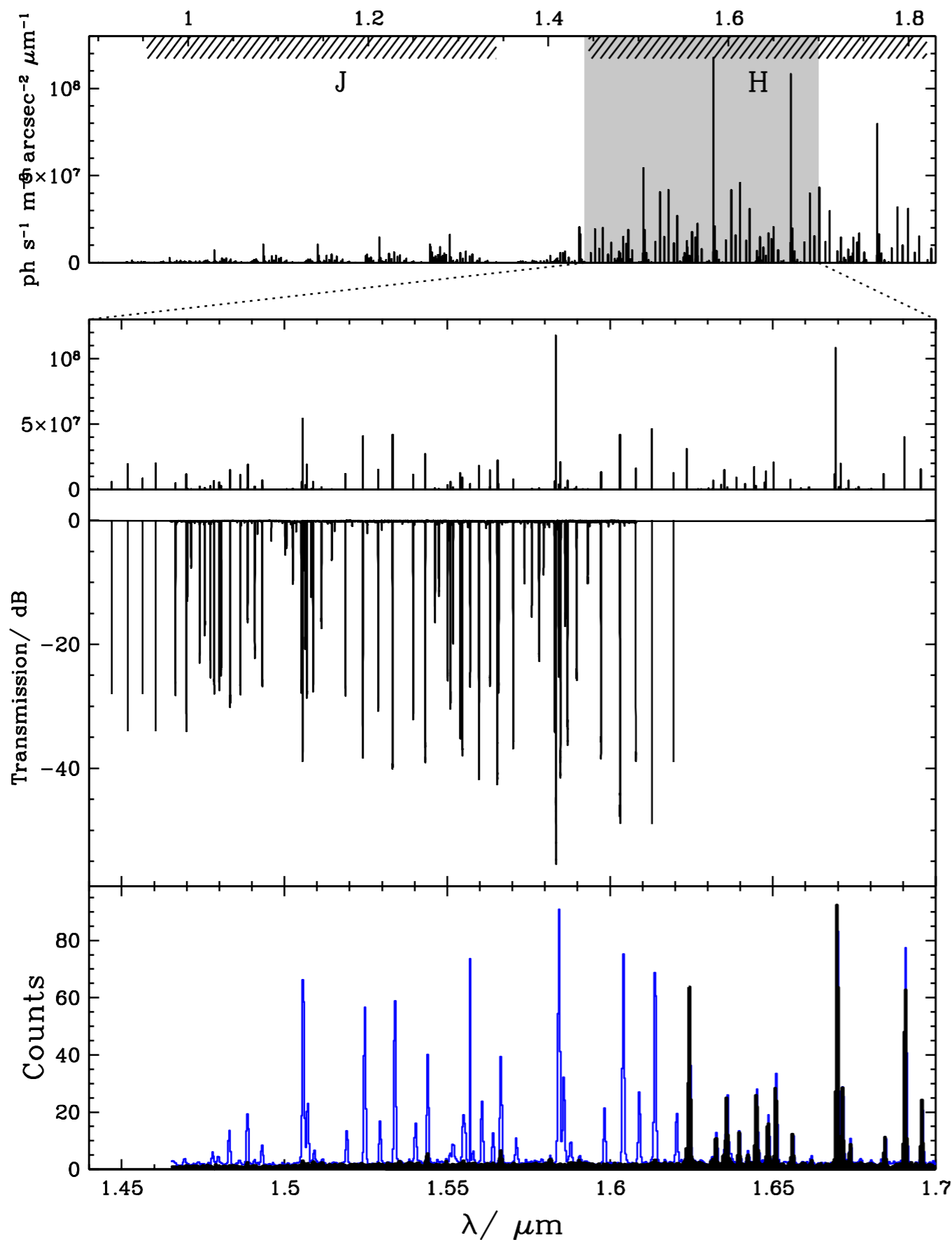


# Photonic Lantern



Leon-Saval, Birks, Bland-Hawthorn, 2005  
Bland-Hawthorn et al. 2007

# On-sky demonstration



2 x 60 $\mu\text{m}$  core fibres pointed directly at sky

Both fed 1x7 lanterns  
- one with FBGs  
- one control

Lanterns feed IRIS2

H band spectrum with  $R=2400$