

# **Some Restricted Mode Launch (RML) Results**

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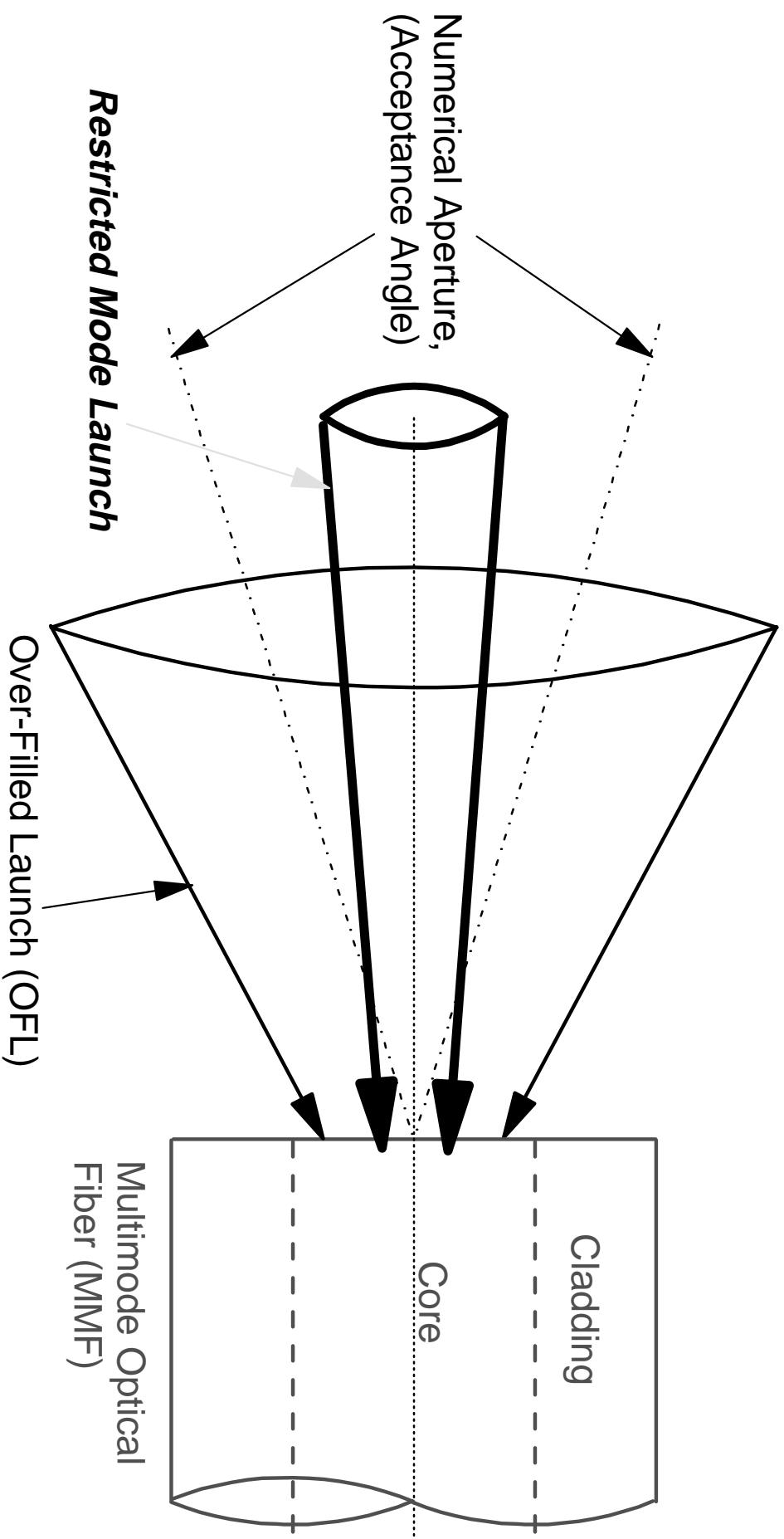
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# Outline

- Restricted Mode Launch
- Theory: 62MMF
- Theory: 50MMF & Experimental Results
- Summary

# Restricted Mode Launch: Pictorial View Of MMF Optical Mode Launch Alternatives

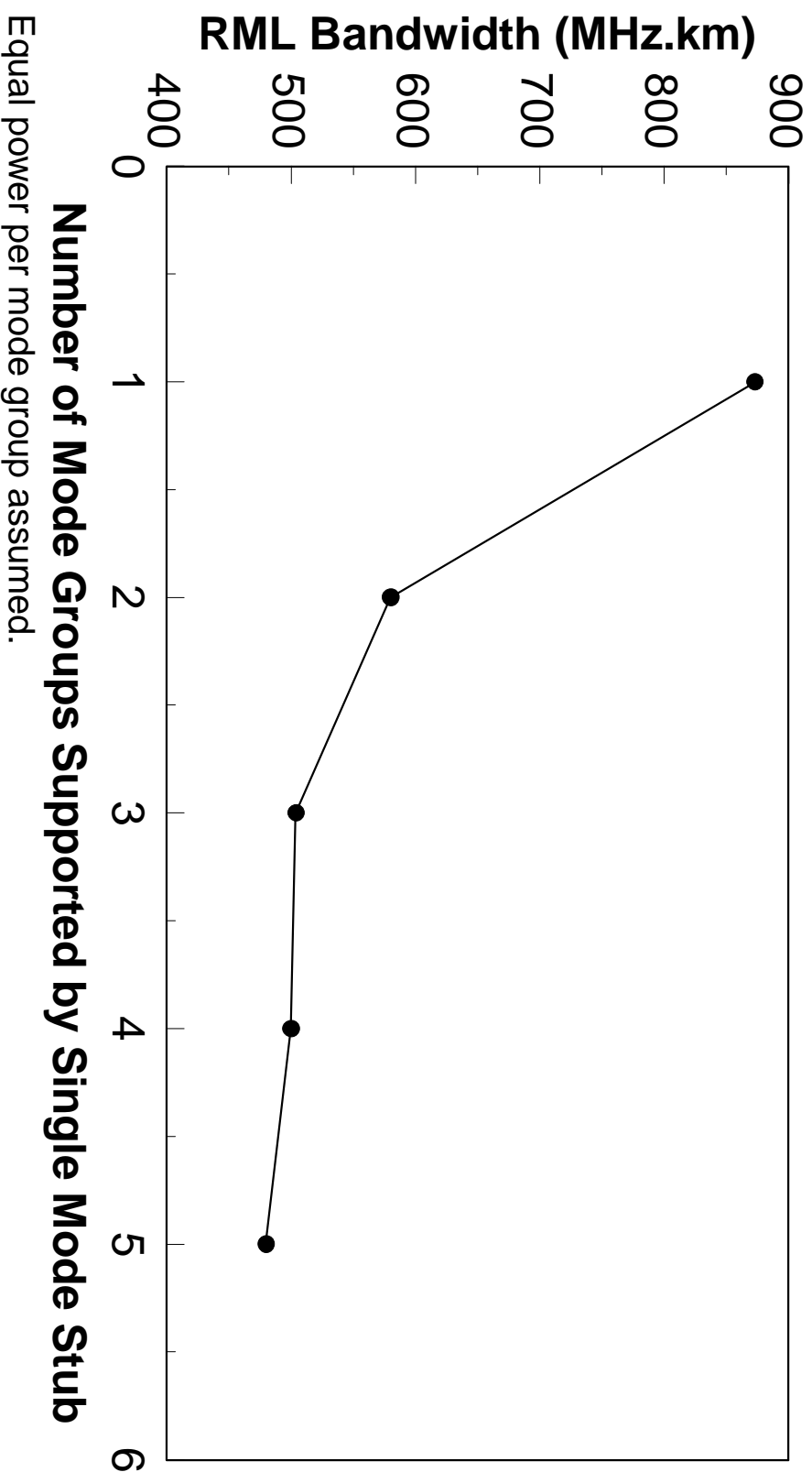


# *Mode Coupling Theory*

- Modes of infinite square-law medium approximate modes of near parabolic MMF
- Let  $[C]$  be mode coupling matrix of the connector joining two fibers
- Then the transmission matrix  $[F]$  for the joint is defined by:  
$$[F] = [C][C]^T$$
- Analytical expressions for mode propagation times used.

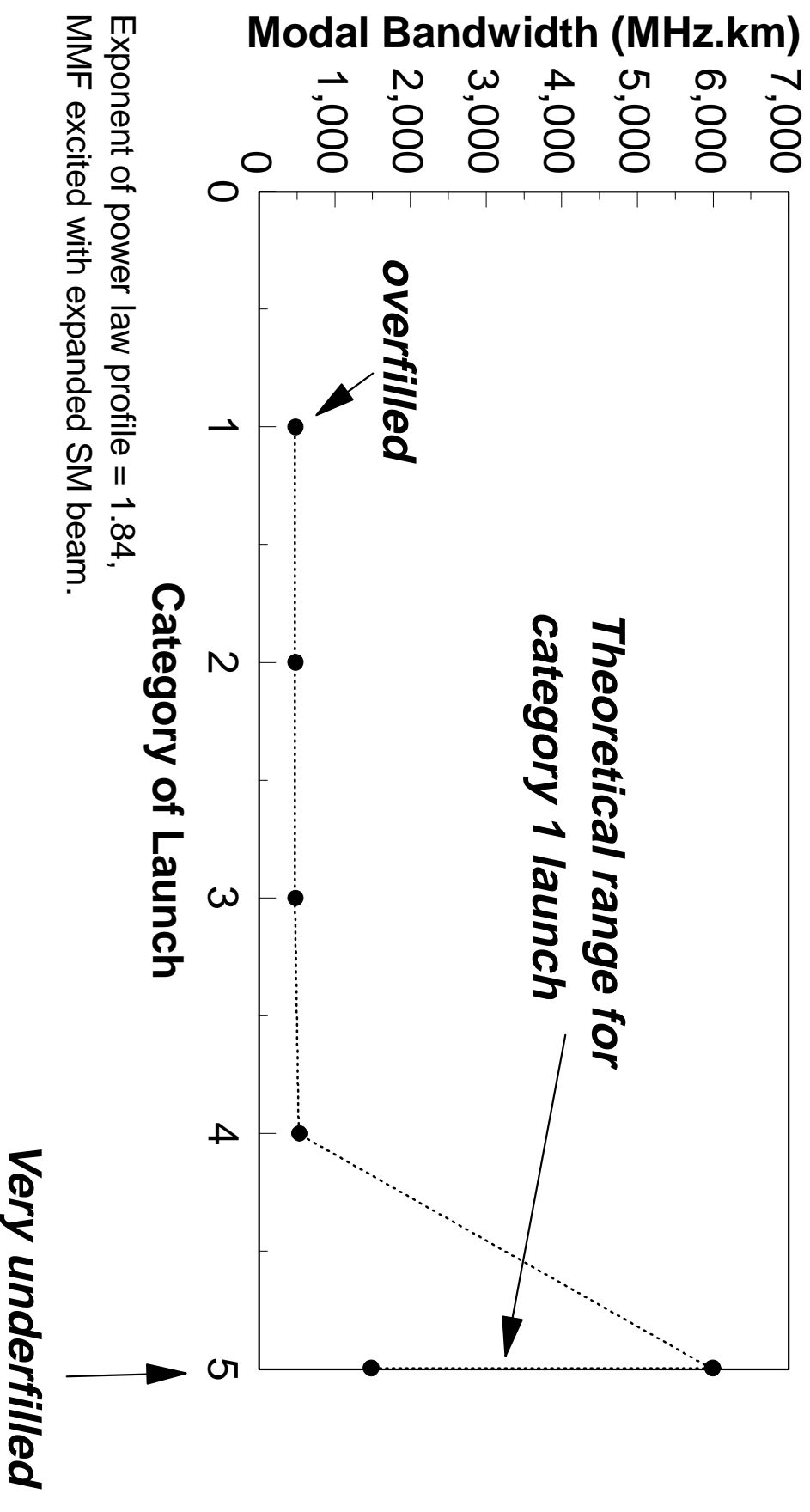
# RML Theory: 62MMF, 1300nm

RML bandwidth Versus Number of Mode Groups Supported by SM Stub



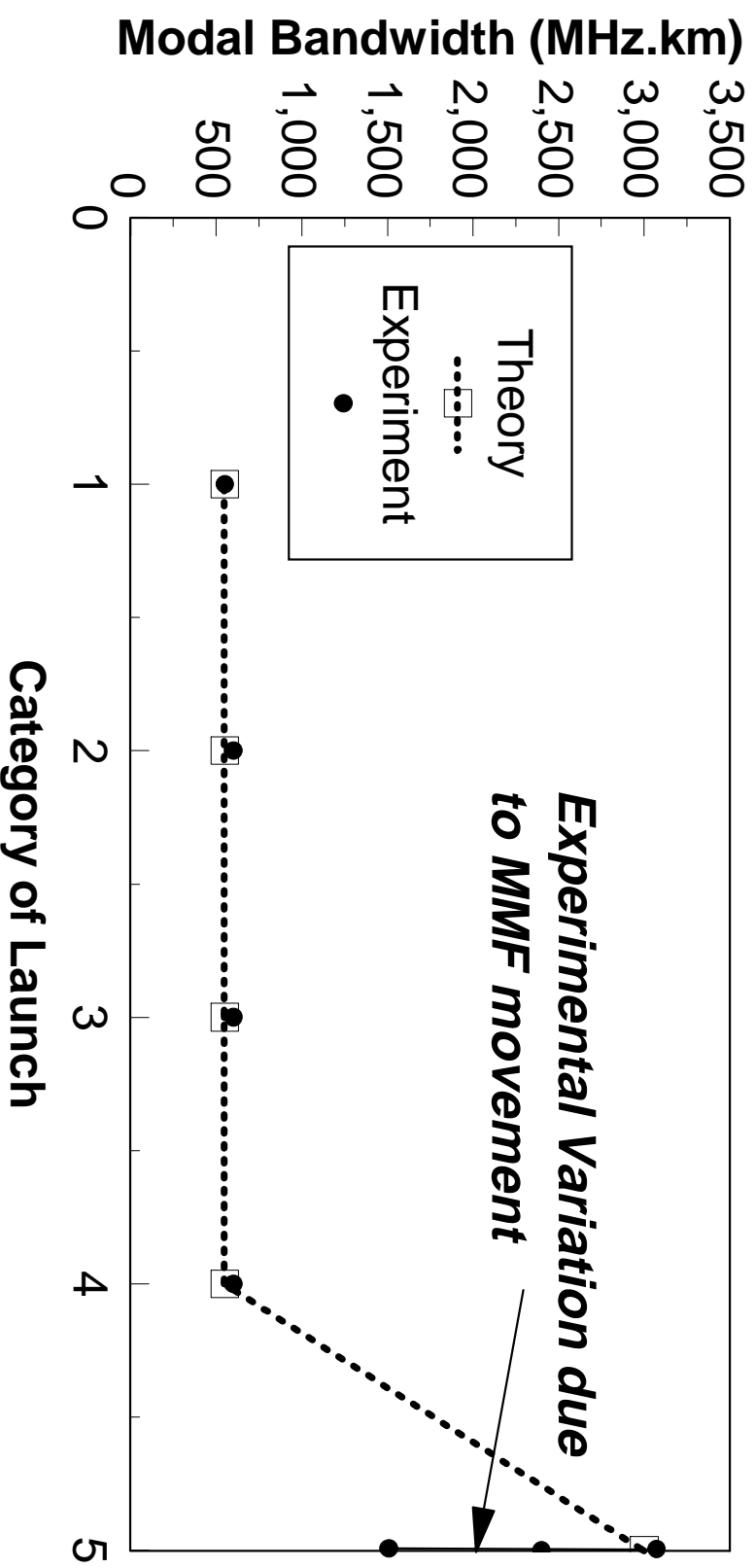
# RML Theory: 62MIMF, 1300nm

Modal Bandwidth versus Launch Category



# Experimental Results: 1km of 50MMF, 1300nm laser

## Modal Bandwidth Versus Launch Category



Exponent of power law profile = 1.84,  
MMF excited with expanded SM beam.

# Summary

Using mode coupling theory for near square law fibers we have shown:

- *Bandwidth enhancement due to RML is very sensitive to category of launch, this will make RML difficult to specify,*
- *Bandwidth with SM transceiver launch into 62MMF is greater than or equal to OFL modal bandwidth of 62MMF.*

**We recommend that the OFL bandwidth be used for all MMF IEEE 802.3z specifications until TIA FO 2-2 completes it work.**