# Optical Time-Domain Reflectometer for POFs

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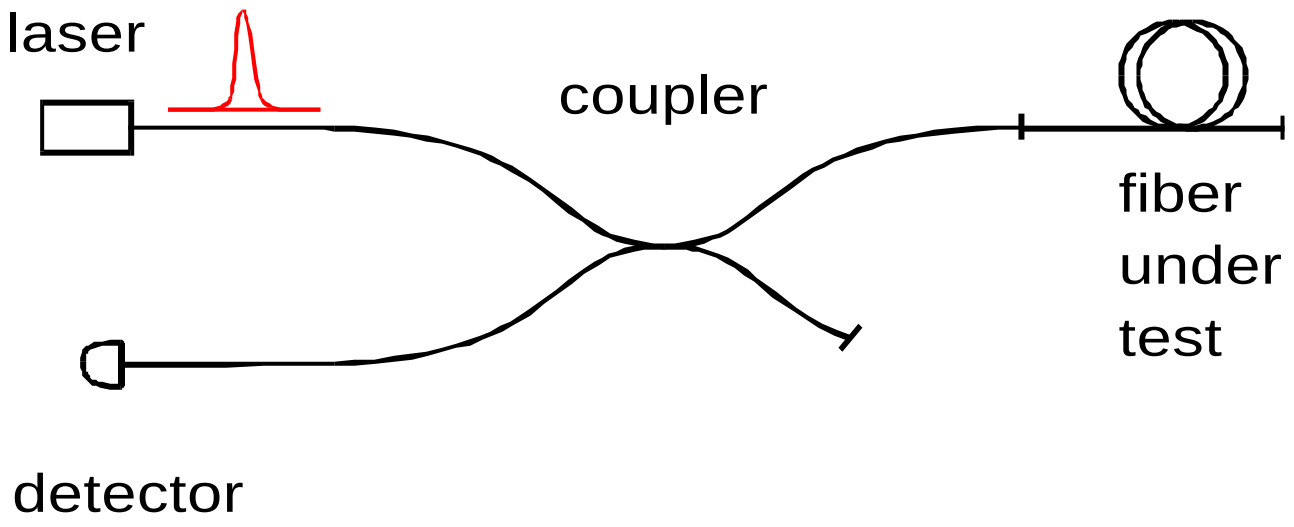
# Outline

- Testing POFs
- Principle of an OTDR
- The photon-counting technique
- Our instrument
- Results
- Conclusion

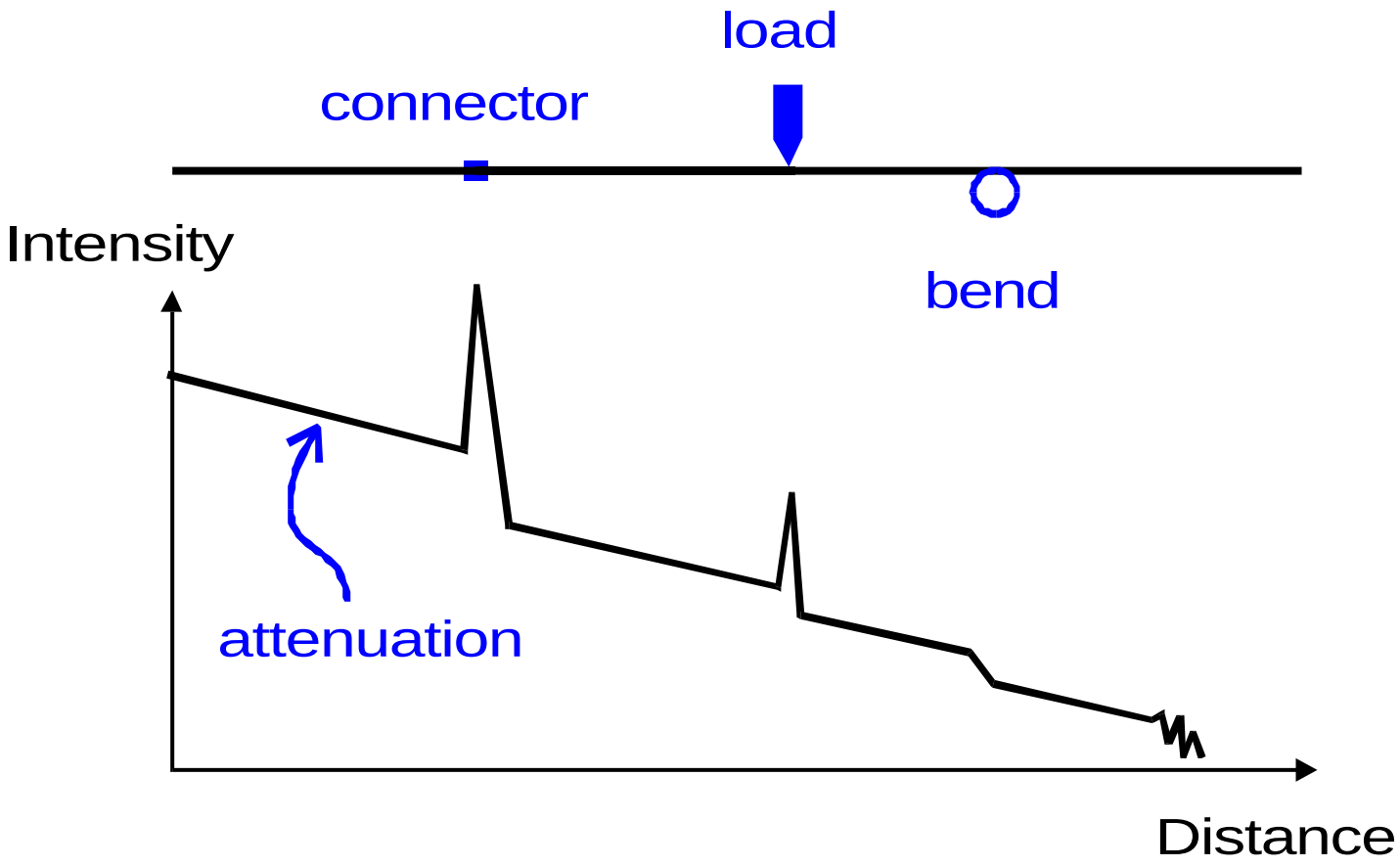
# Testing POFs

| Parameter | | Instrument |
|---|---|---|
| • Loss (global) | ⇒ | power meter |
| • Loss (local&global) | ⇒ | OTDR |
| • Loss (λ) | ⇒ | OSA... |
| • Fault location | ⇒ | OTDR |
| • (Modal-)Dispersion | ⇒ | OTDR?... |
| • Polarization effects | | |

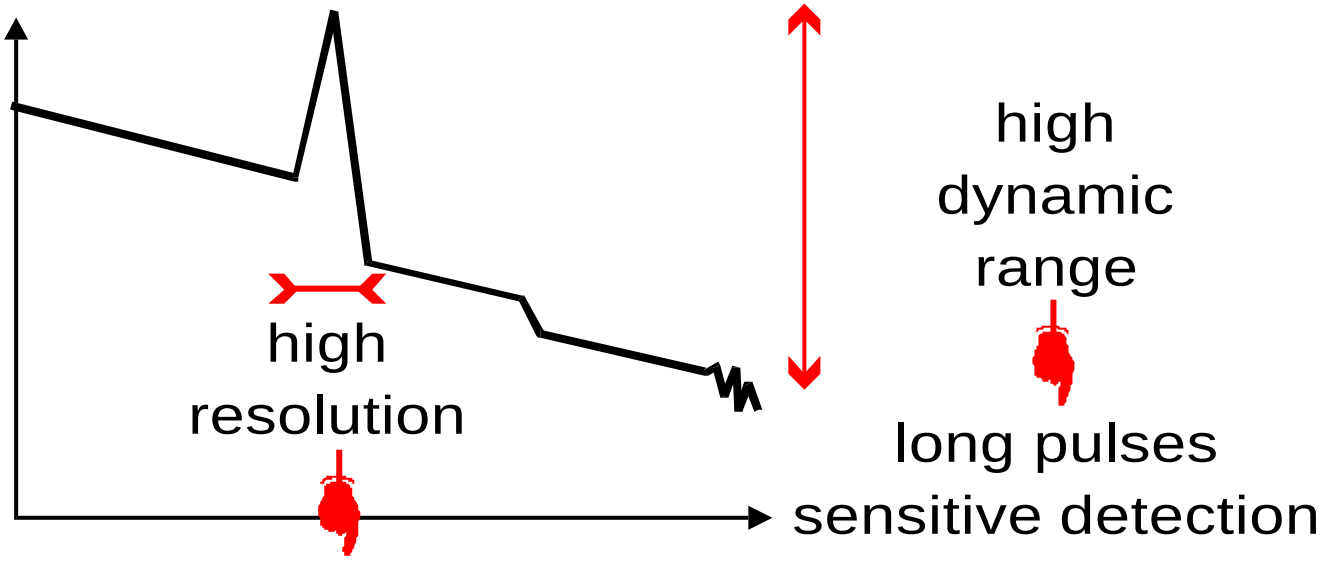
# Principle of an OTDR:



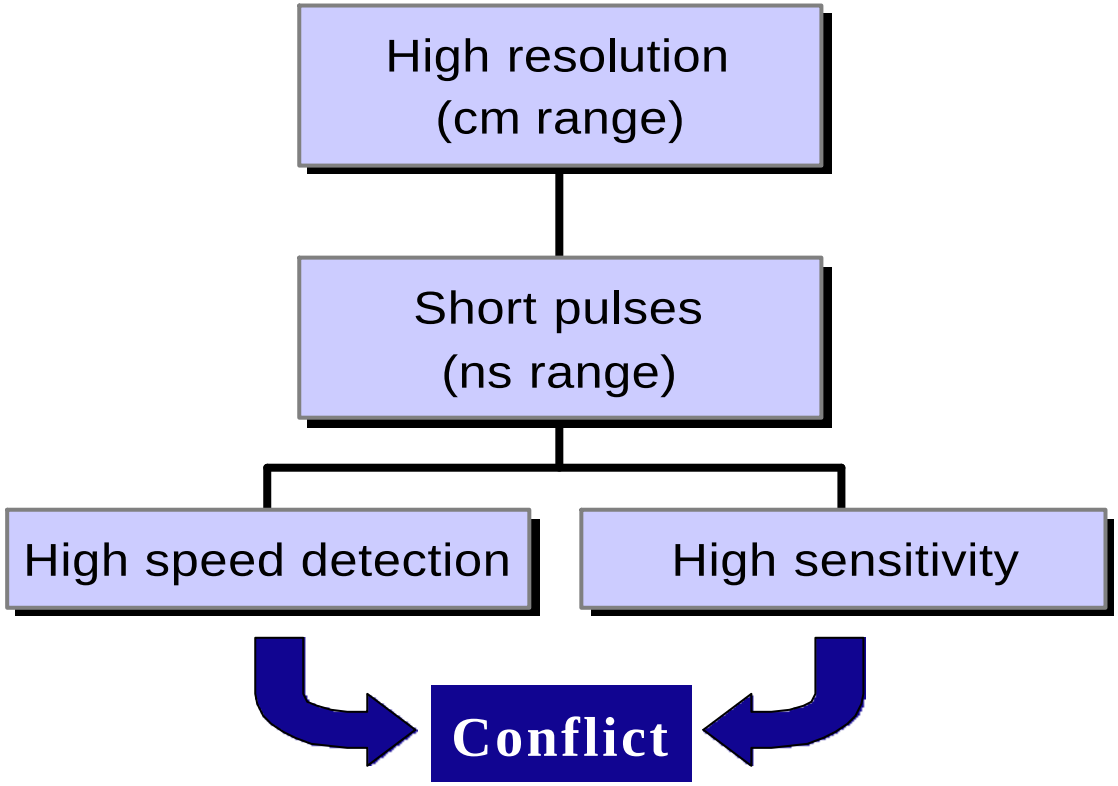
# OTDR: what can you see?



# OTDR: a well-balanced trade-off between conflicting demands...



# OTDR for POFs



# Solution: Use Photon-counting technique!

- Highest sensitivity & high timing resolution!

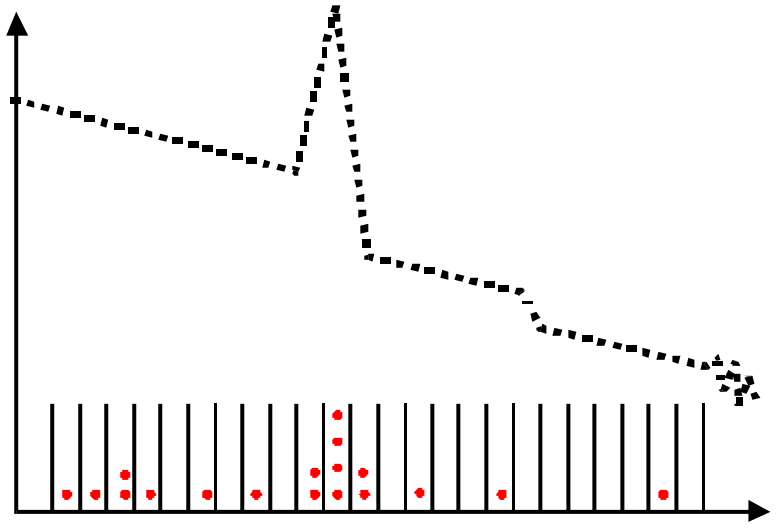
⇒ Break the sensitivity/bandwidth barrier

- No dead zone:

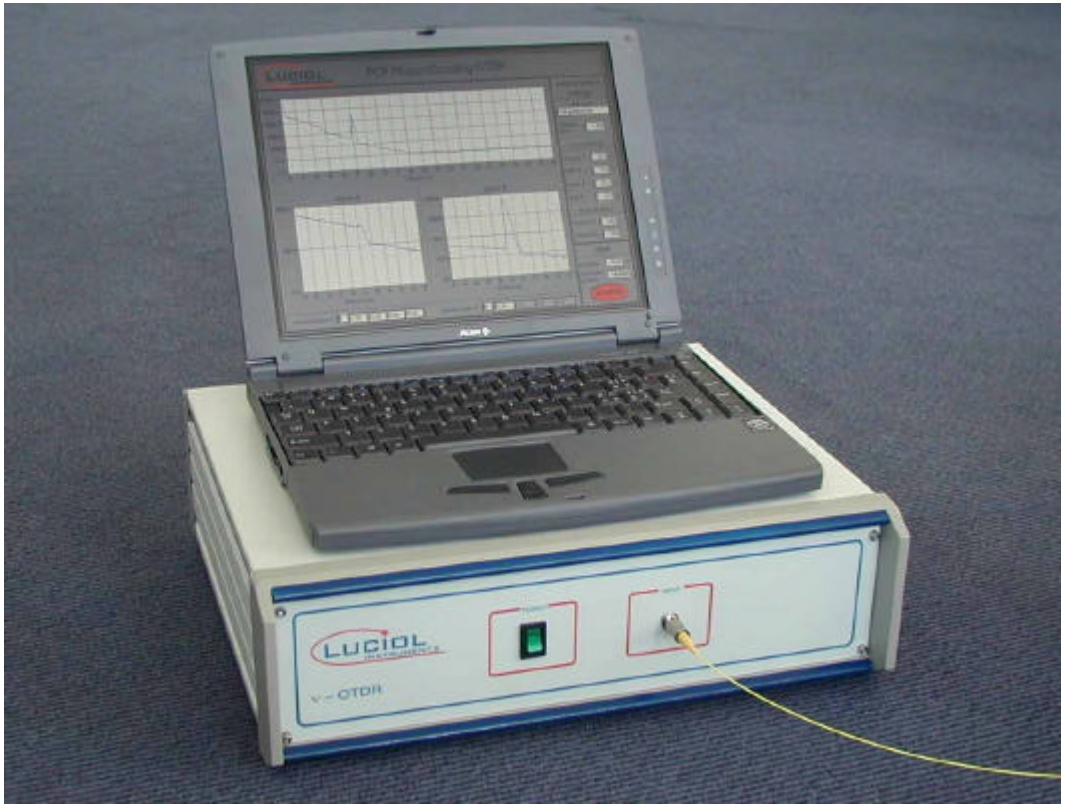
⇒ Resolve closely spaced events

# Photon-counting technique: how does it work?

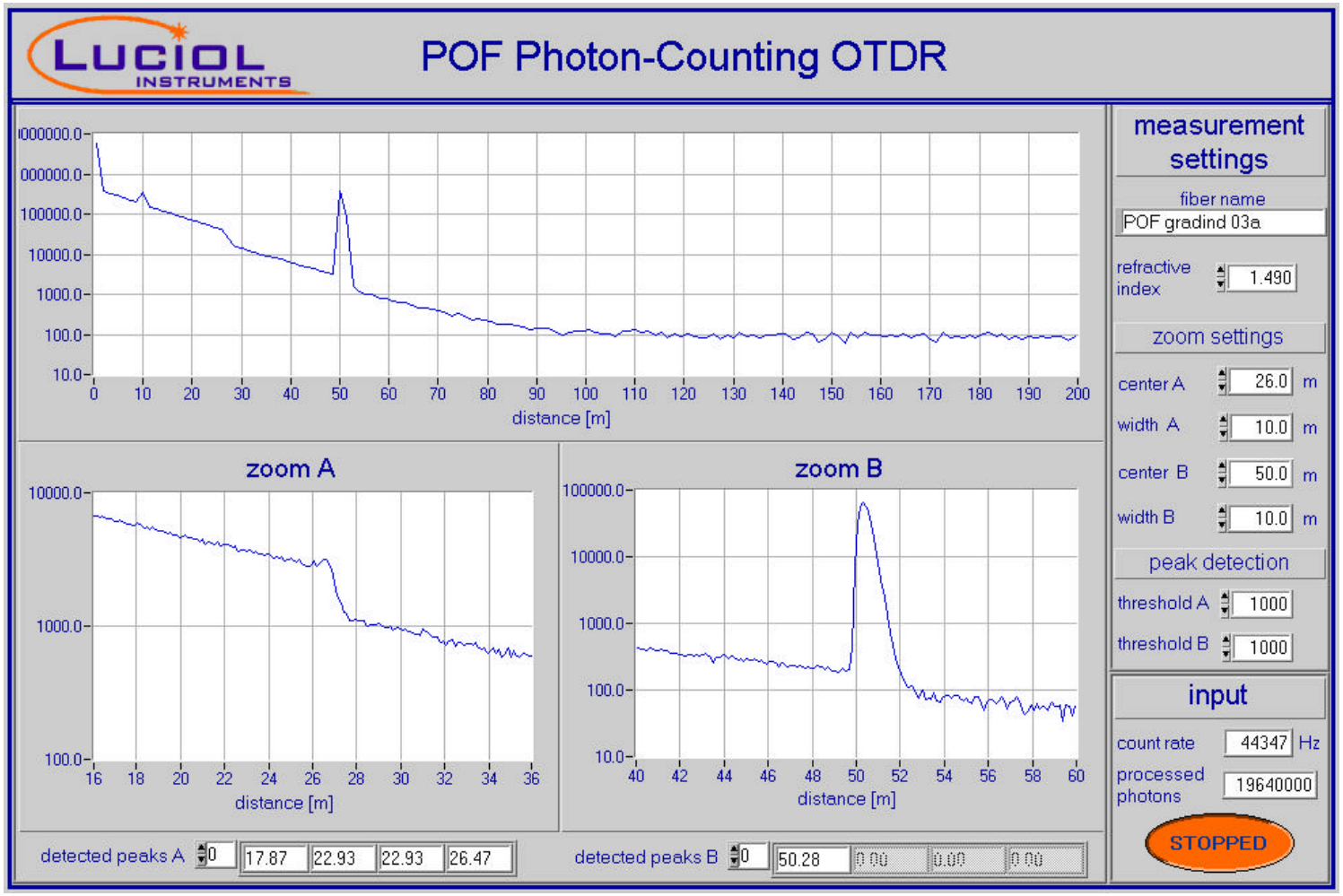
One pulse, one count



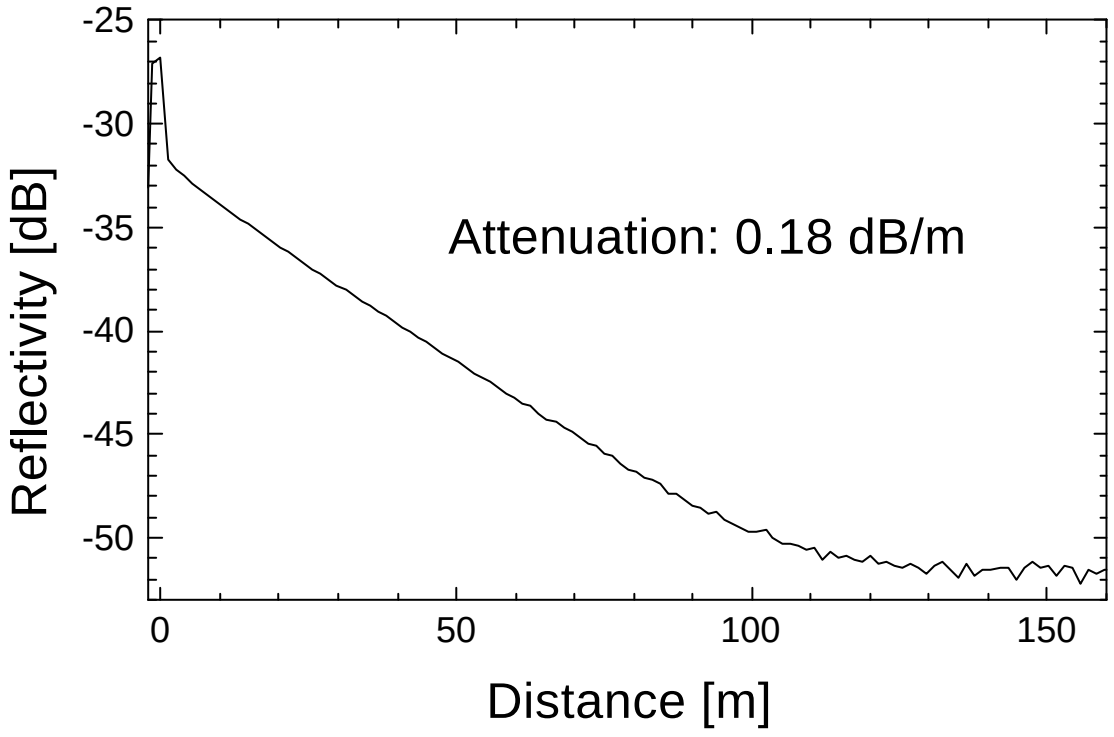
# Our instrument



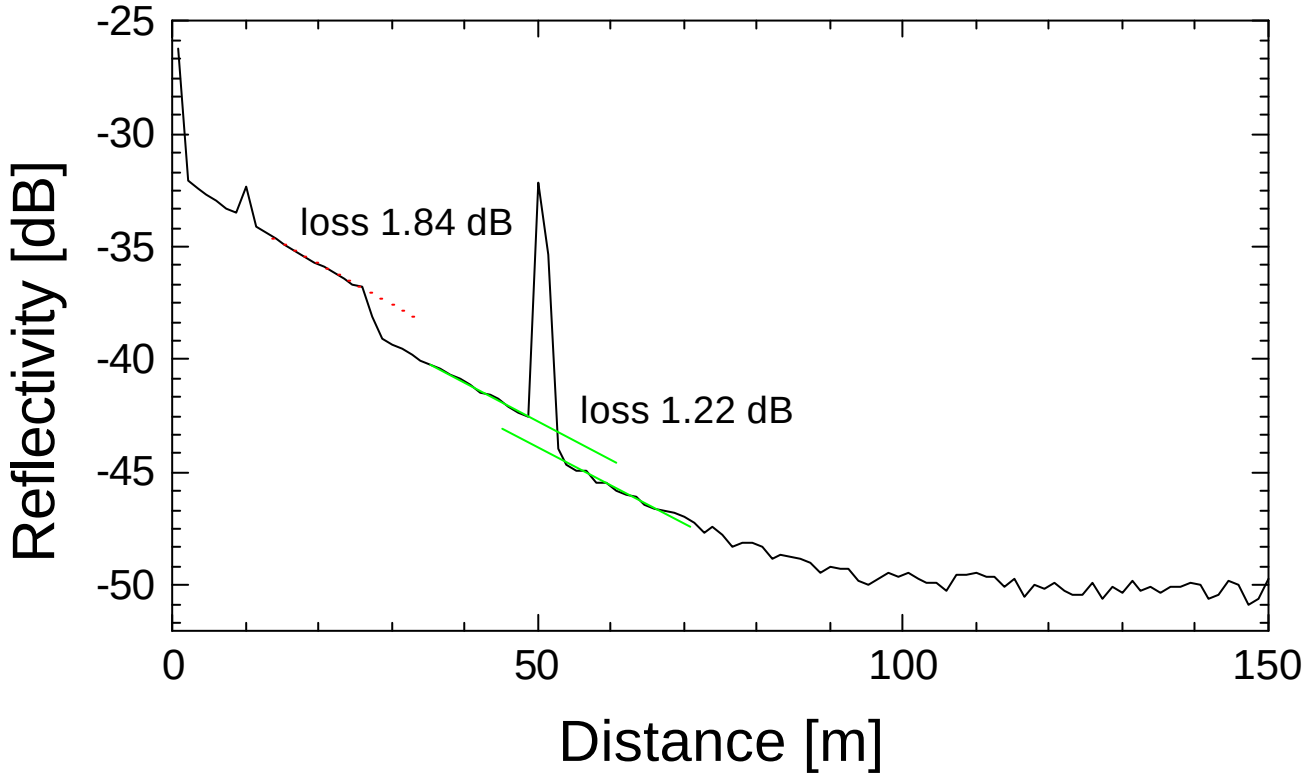
# screenshot


LUCIOL INSTRUMENTS
POF Photon-Counting OTDR
1000000.0
100000.0
10000.0
1000.0
100.0
10.0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
distance [m]
zoom A
10000.0
1000.0
100.0
16 18 20 22 24 26 28 30 32 34 36
distance [m]
zoom B
100000.0
10000.0
1000.0
100.0
10.0
40 42 44 46 48 50 52 54 56 58 60
distance [m]
detected peaks A 0 17.87 22.93 22.93 26.47
detected peaks B 0 50.28 0.00 0.00 0.00
measurement settings
fiber name
POF gradind 03a
refractive index 1.490
zoom settings
center A 26.0 m
width A 10.0 m
center B 50.0 m
width B 10.0 m
peak detection
threshold A 1000
threshold B 1000
input
count rate 44347 Hz
processed photons 19640000
STOPPED

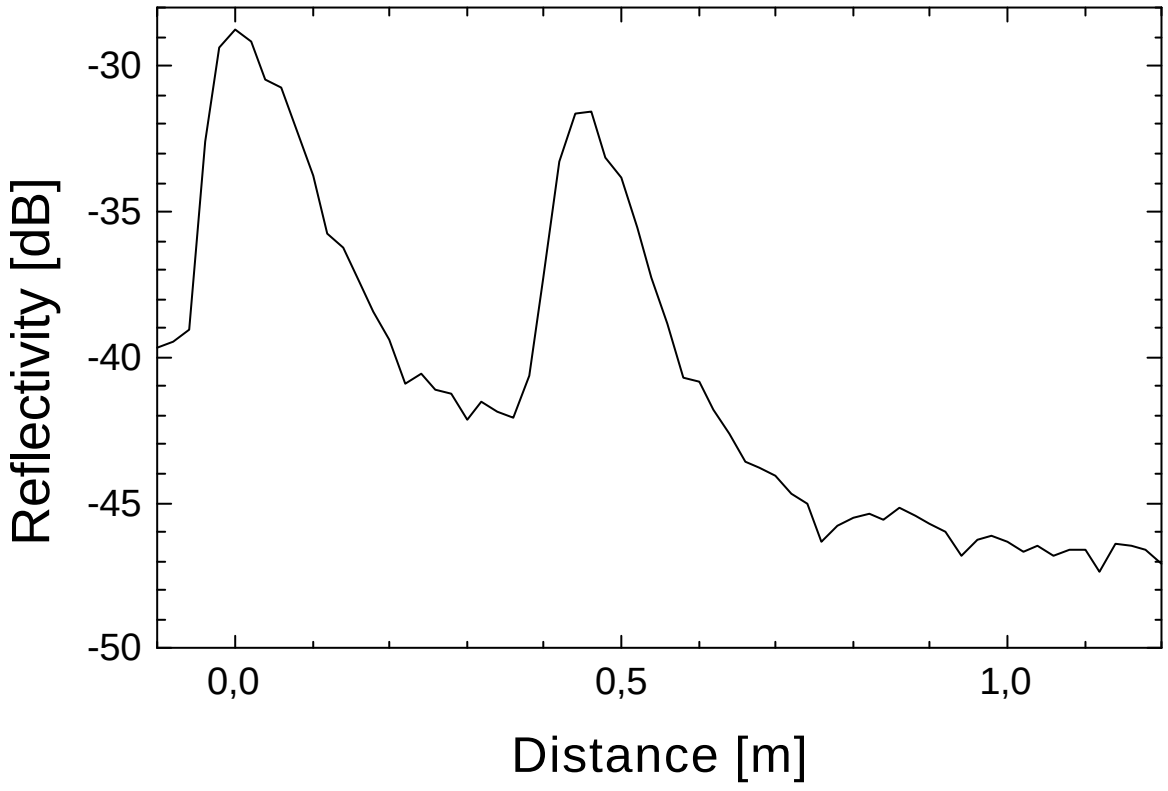
# Results: Attenuation of a POF



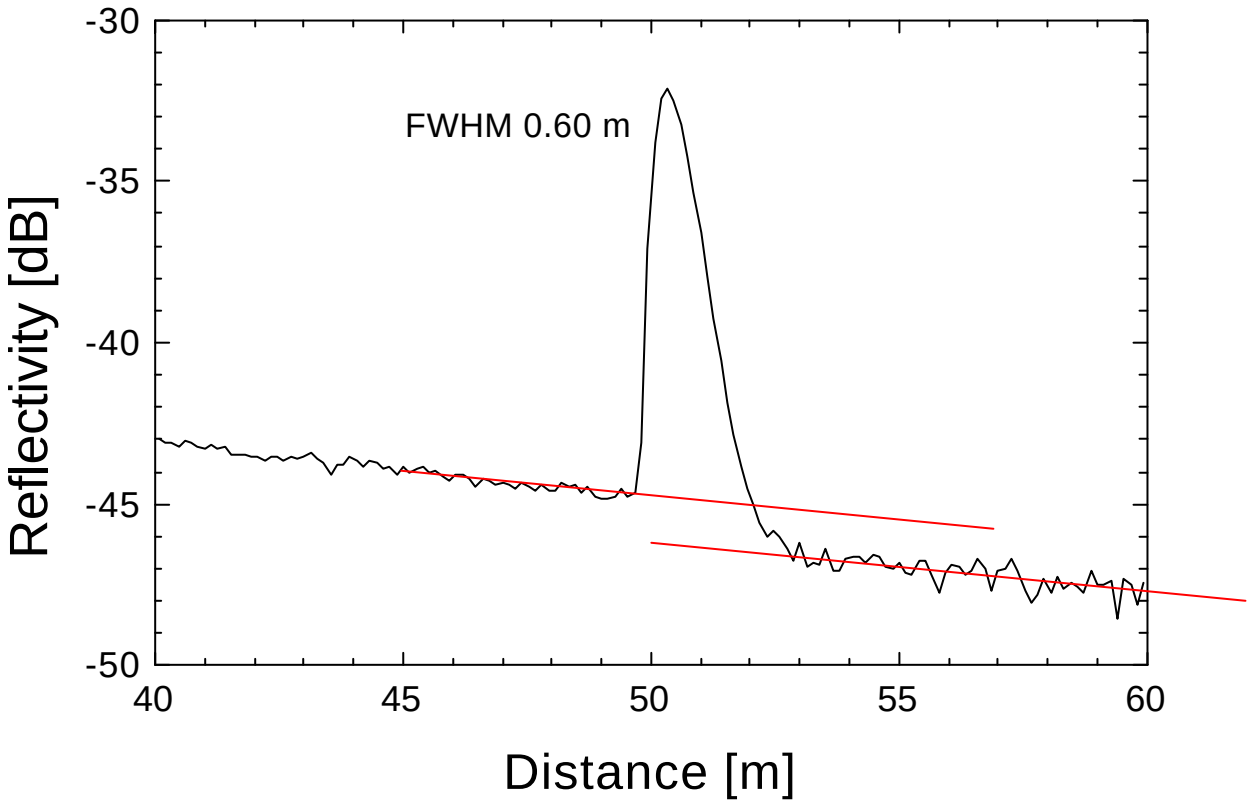
# Results: POF with several features



# Results: High resolution



# Results: Modal Dispersion



# Conclusion

Use the right tools!

Think OTDR!