BRAINF***

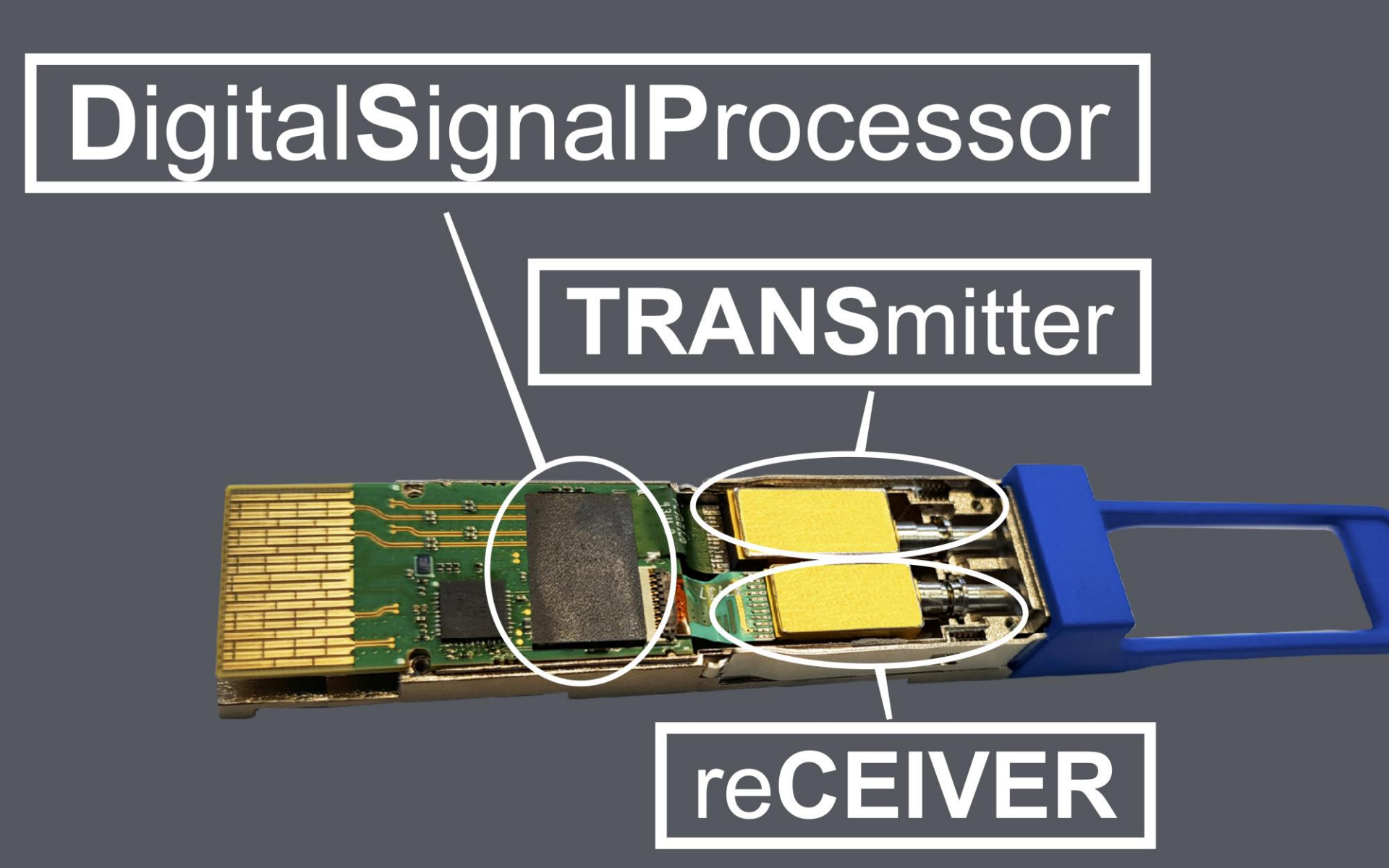
is also a programming language :-)

source: https://de.wikipedia.org/wiki/Brainfuck, November 2025

Channelmania!

Future-proof your DWDM network topology
while keeping it flexible for 1.6T



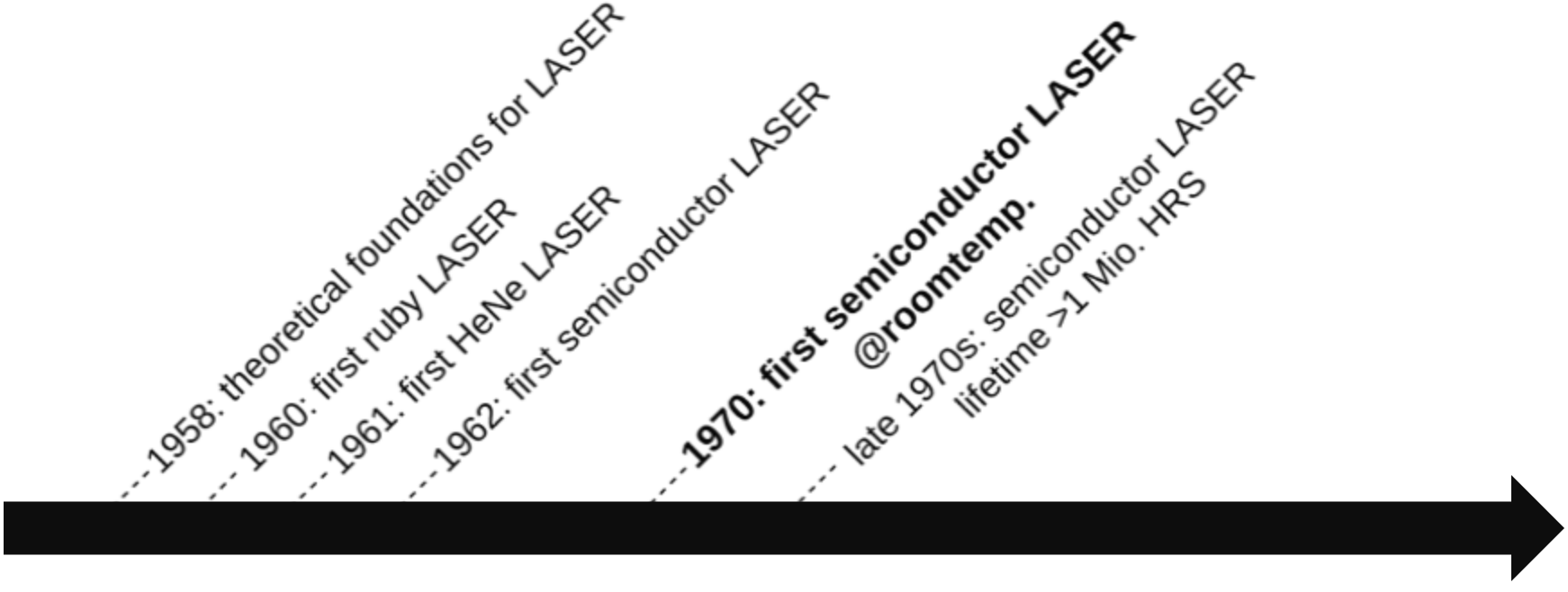

DigitalSignalProcessor
TRANSmitter
reCEIVER

Source / Laser

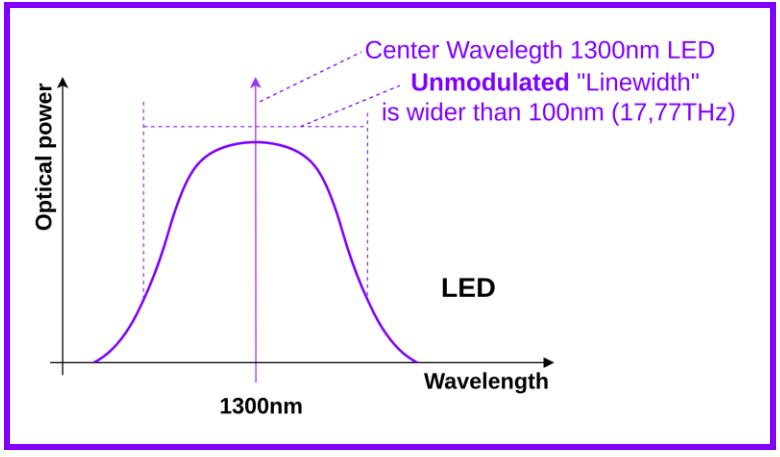
Bulky
Powerhungry
Difficult to operate

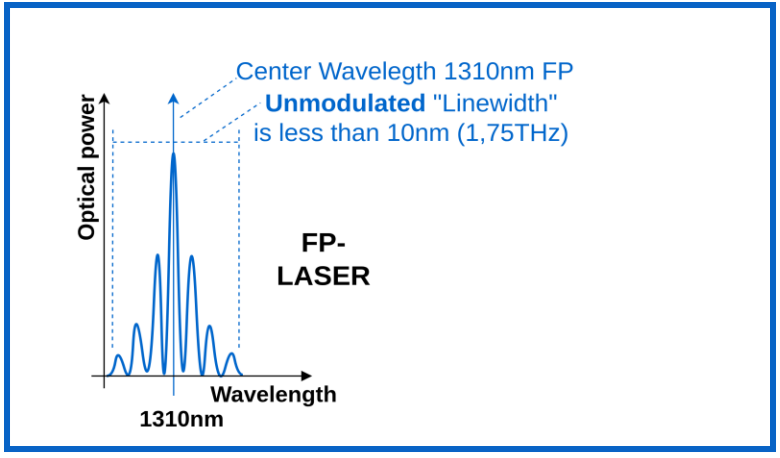
Past → **Present**

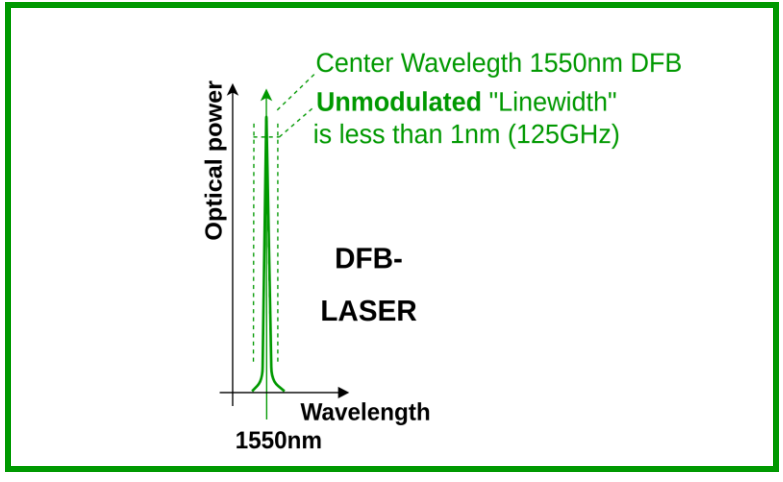
Small
Efficient
Reliable

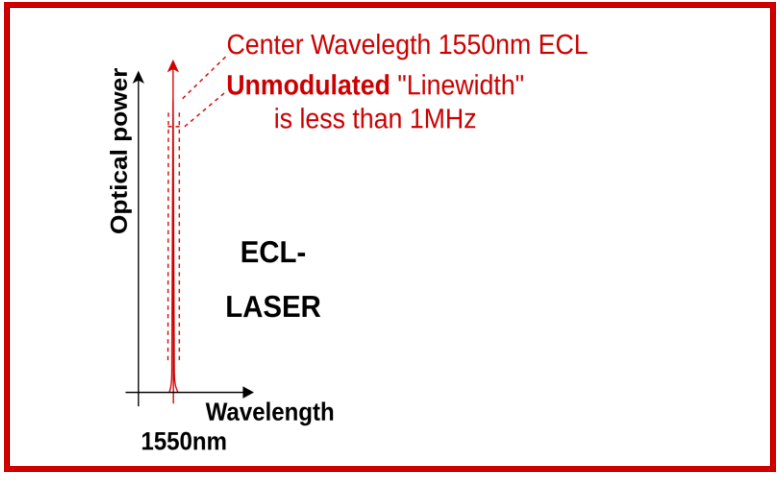


Source Spectrum

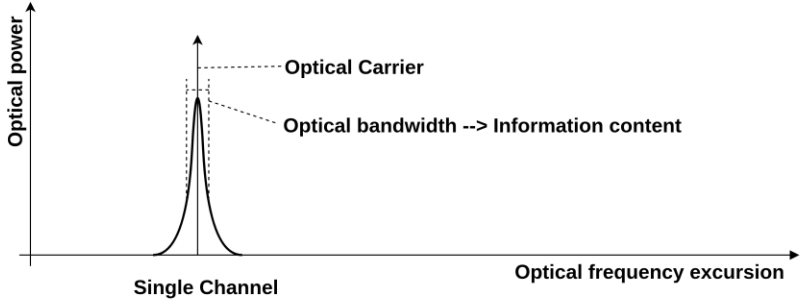


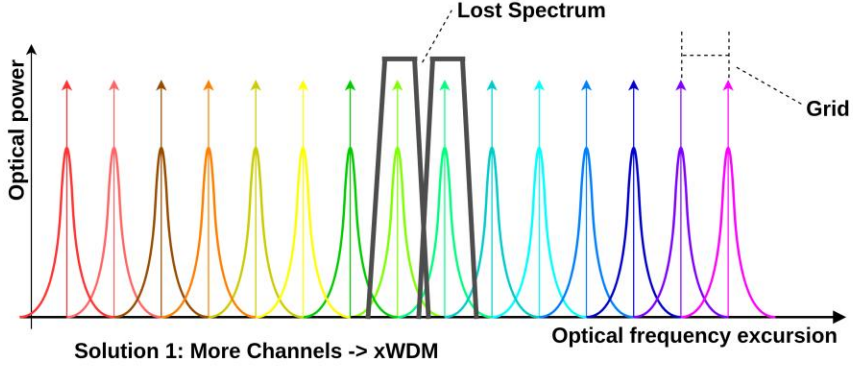


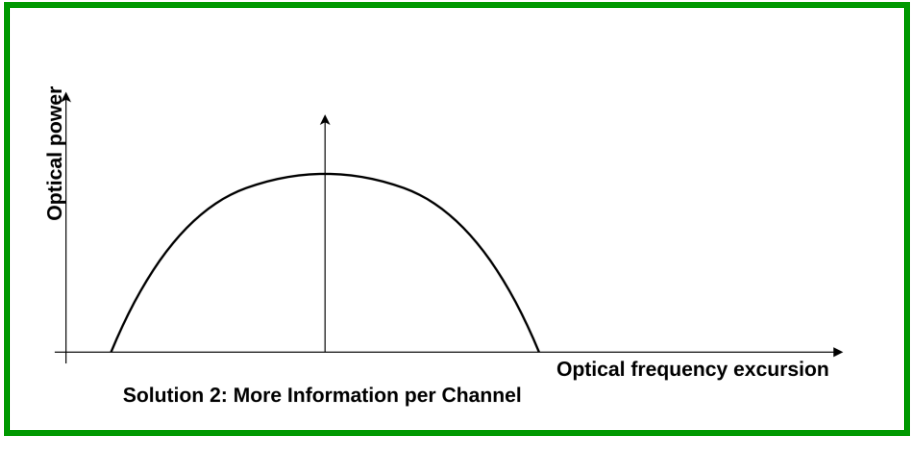




Increasing bandwidth per fiber



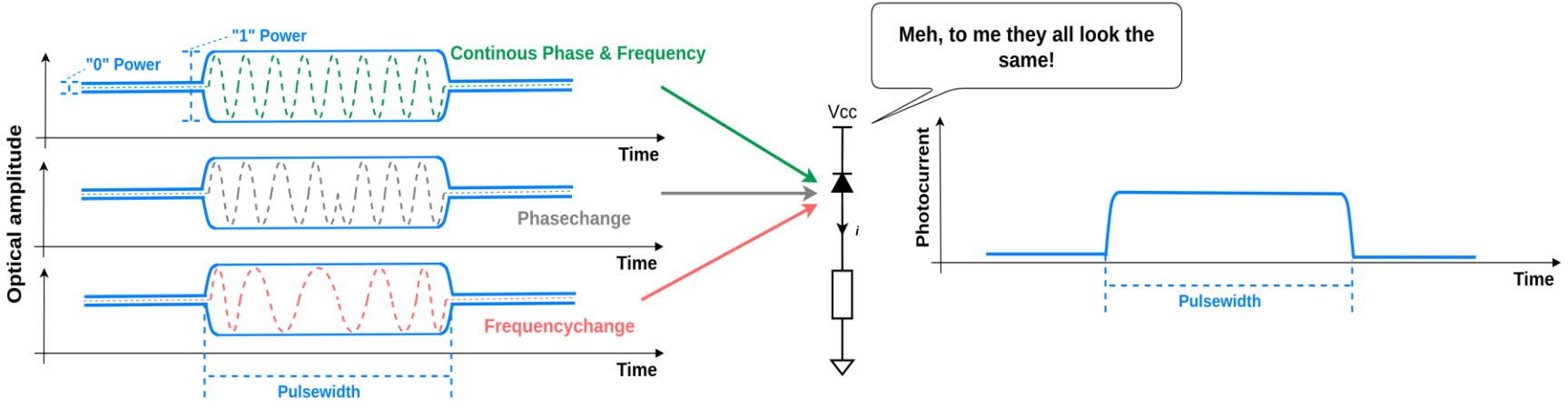




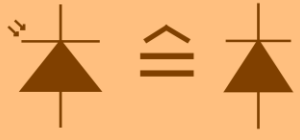
this was the easy part 1/3

now back to complex numbers ->

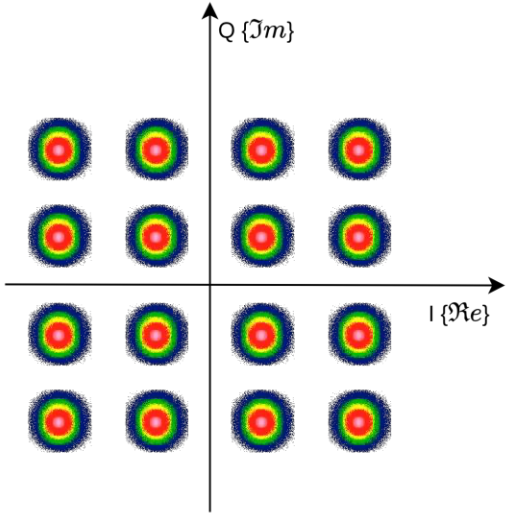
Limitations of On-Off-Keying (OOK) with Direct Detection

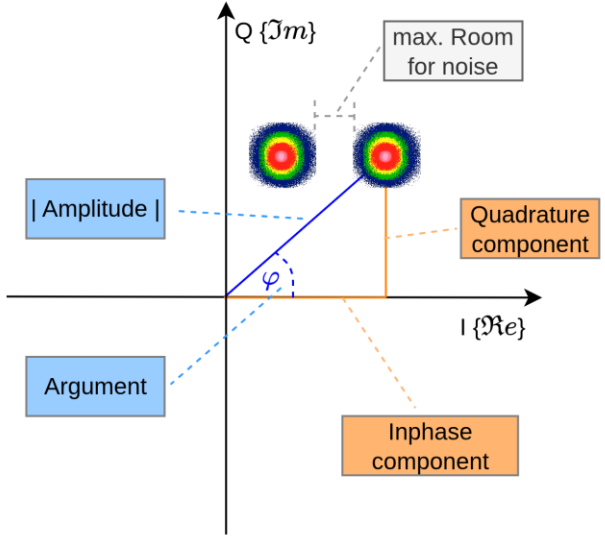


to be precise



Higher order modulation constellations



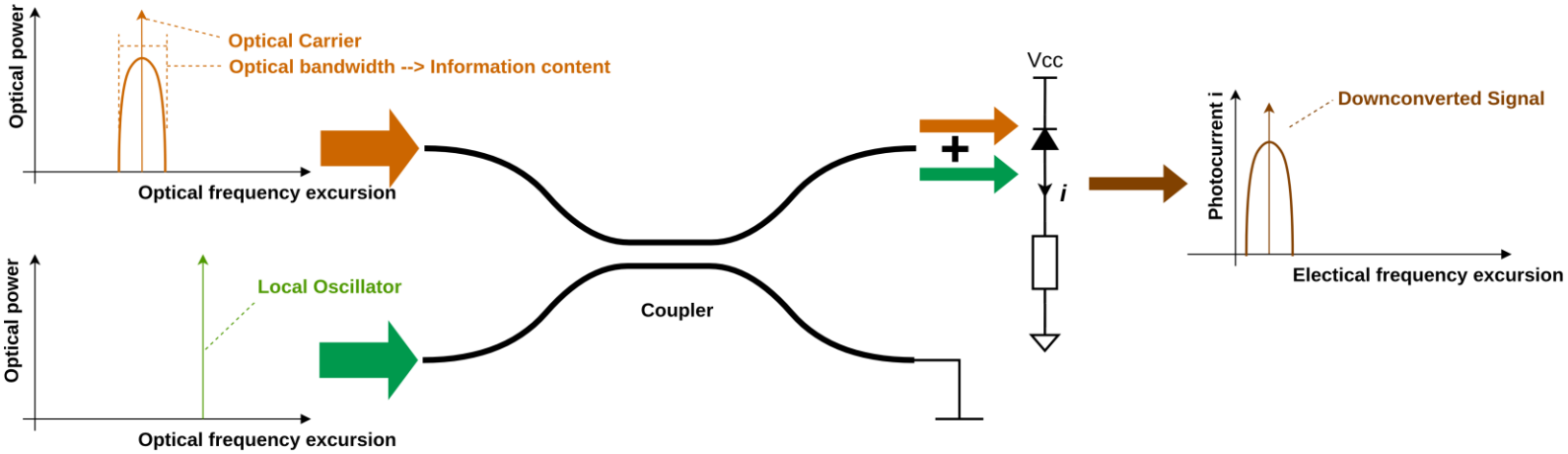


- 16 constellations encode 4 Bits/SYM
- Two of those patterns are sent on orthogonal polarizations
- 425Gbps @ 53.125GBd/s

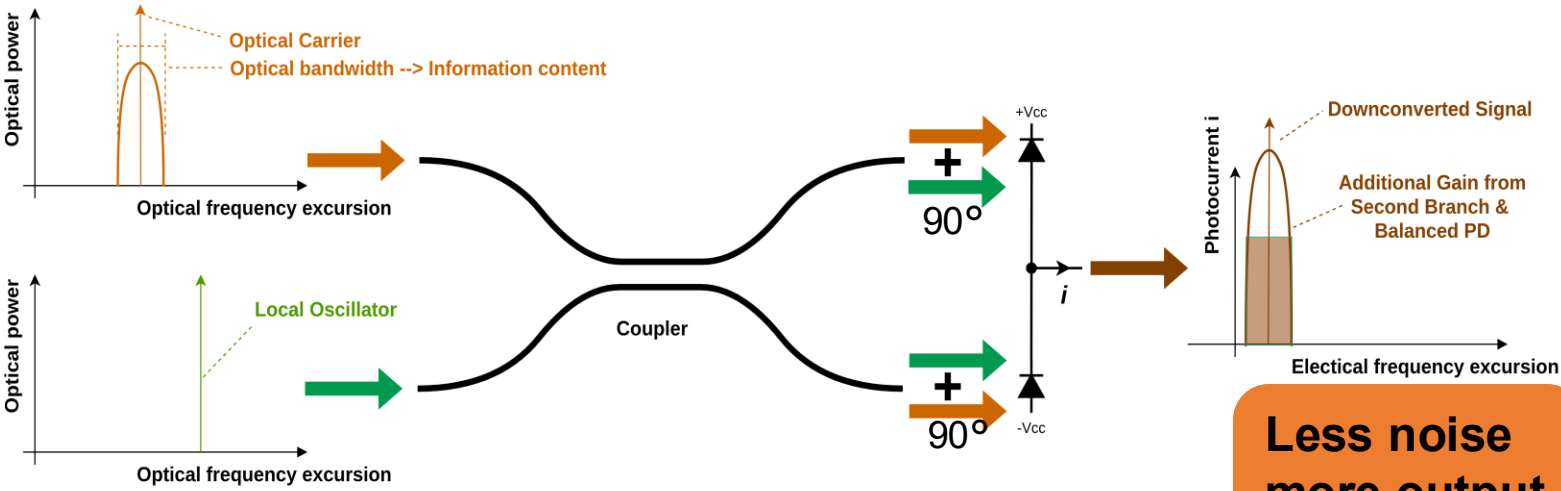
- Constellation can be expressed by either Amplitude and Argument or by the I and Q -components
- Less room for noise, compared to OOK

Receiver

Single-Ended

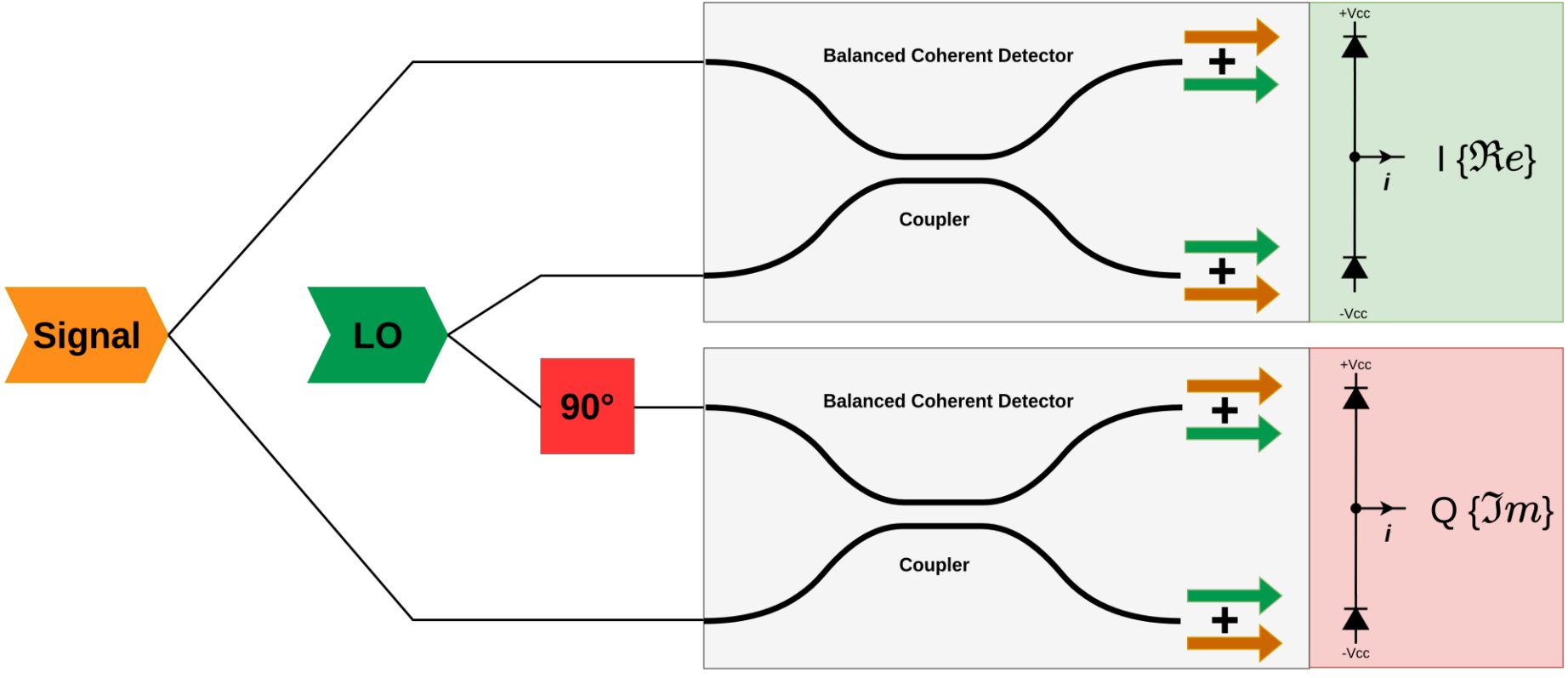


Balanced

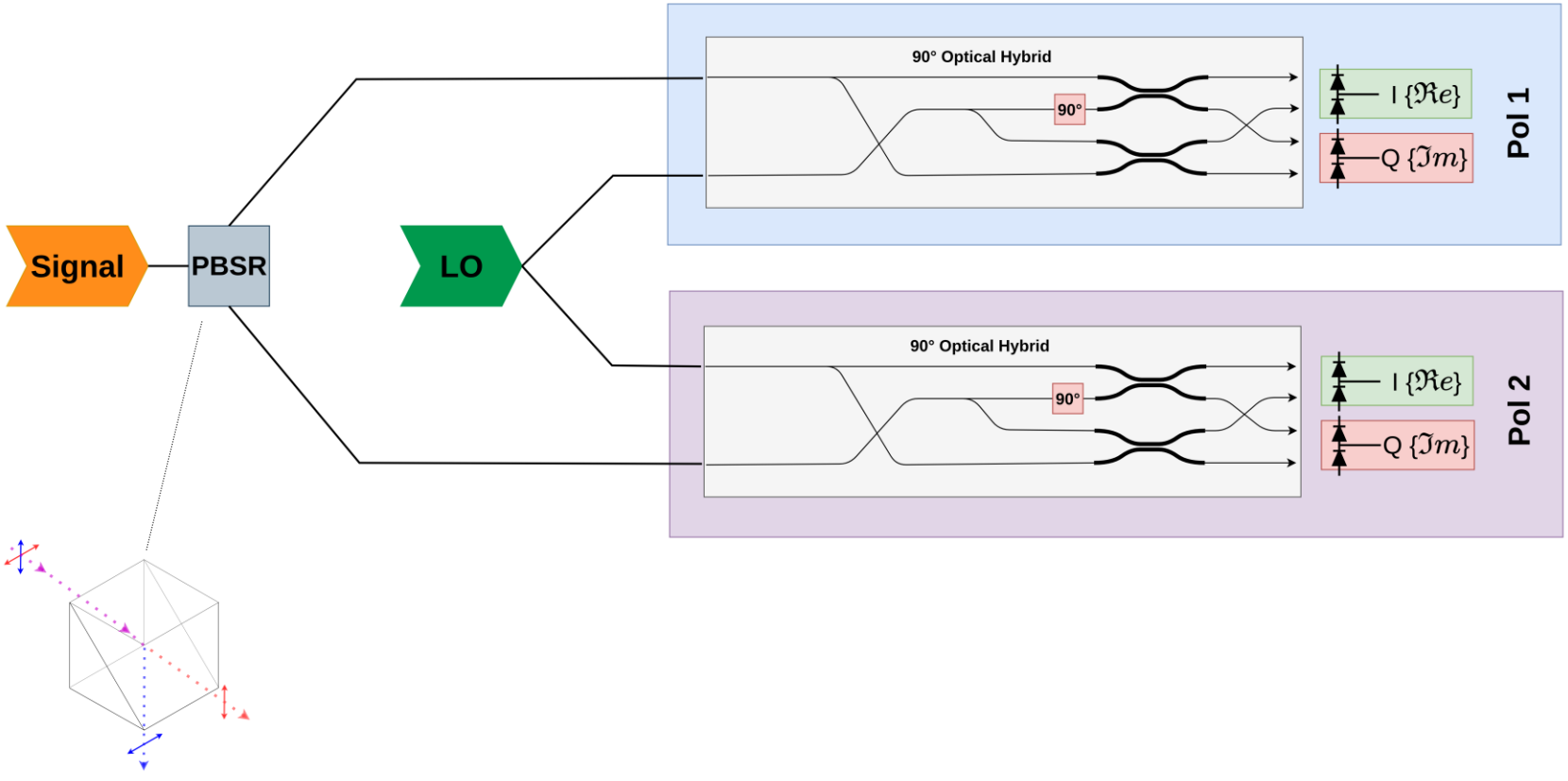


Less noise more output

Phase-Diversity



Phase-&-Polarization-Diversity



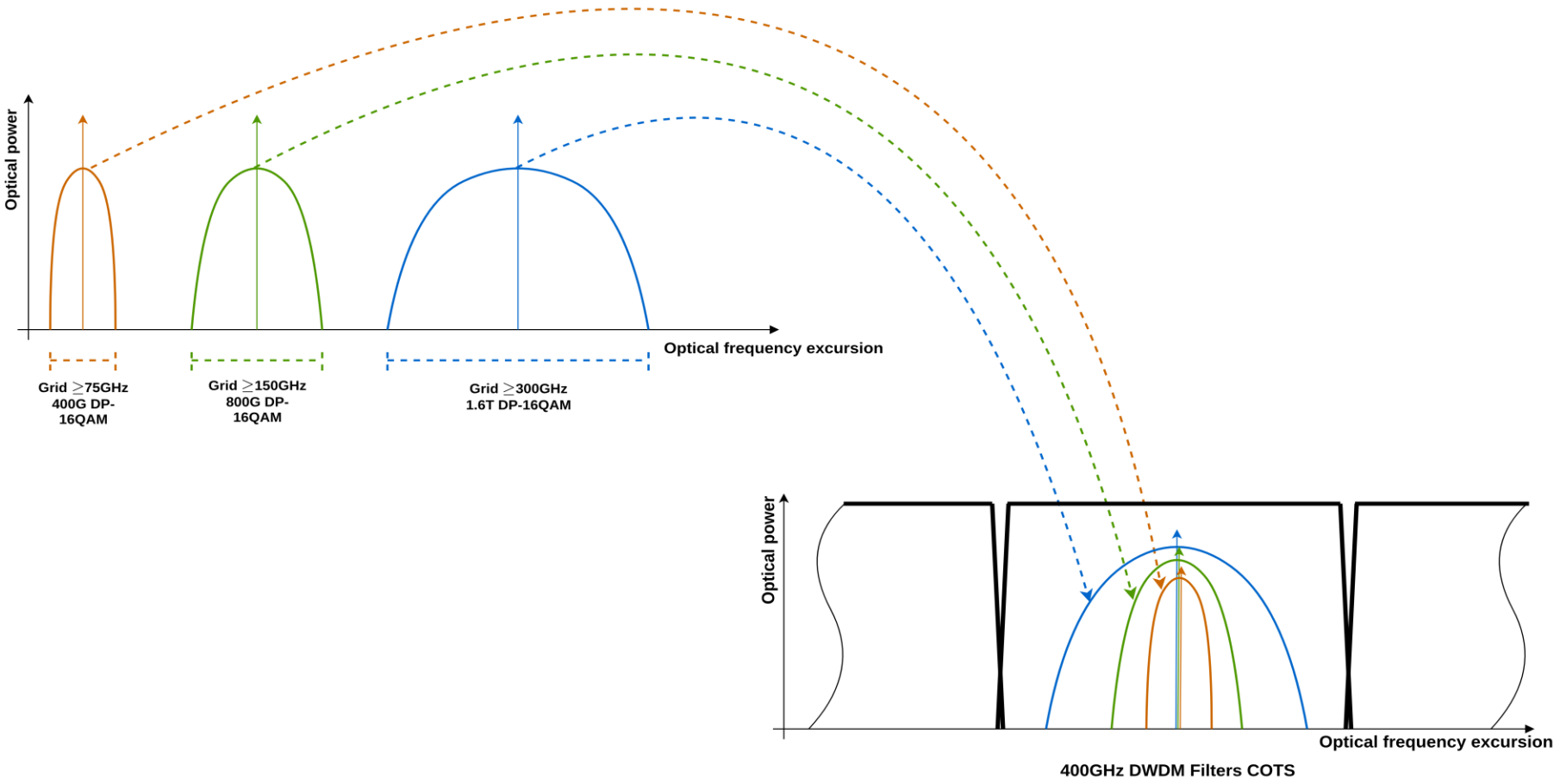


DENOG17

10.11.2025
Haus der
Technik
Essen
Germany

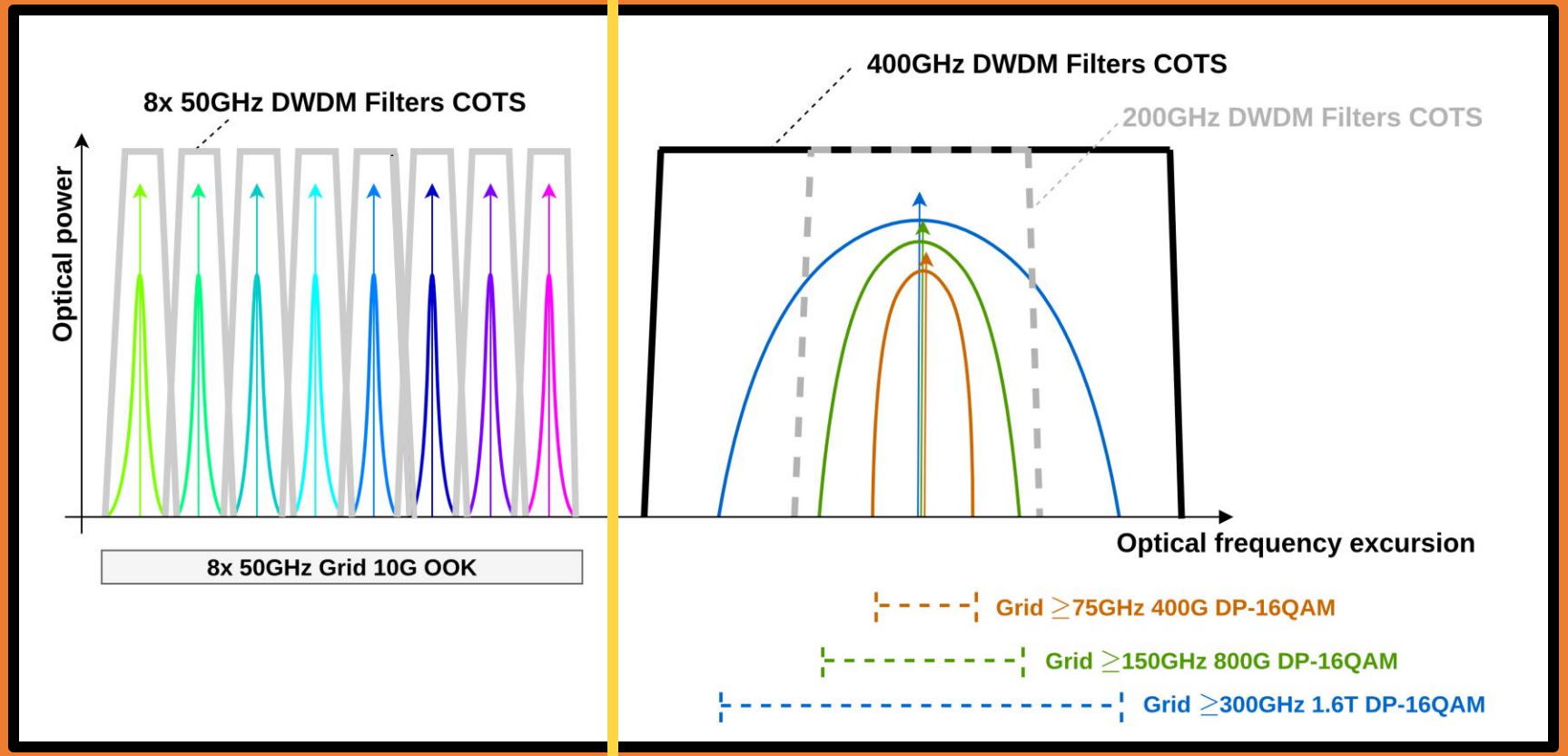
half way through

Coherent Detection Bandwidth



96 x 50GHz channels in C-Band

12 x 400GHz channels in C-Band

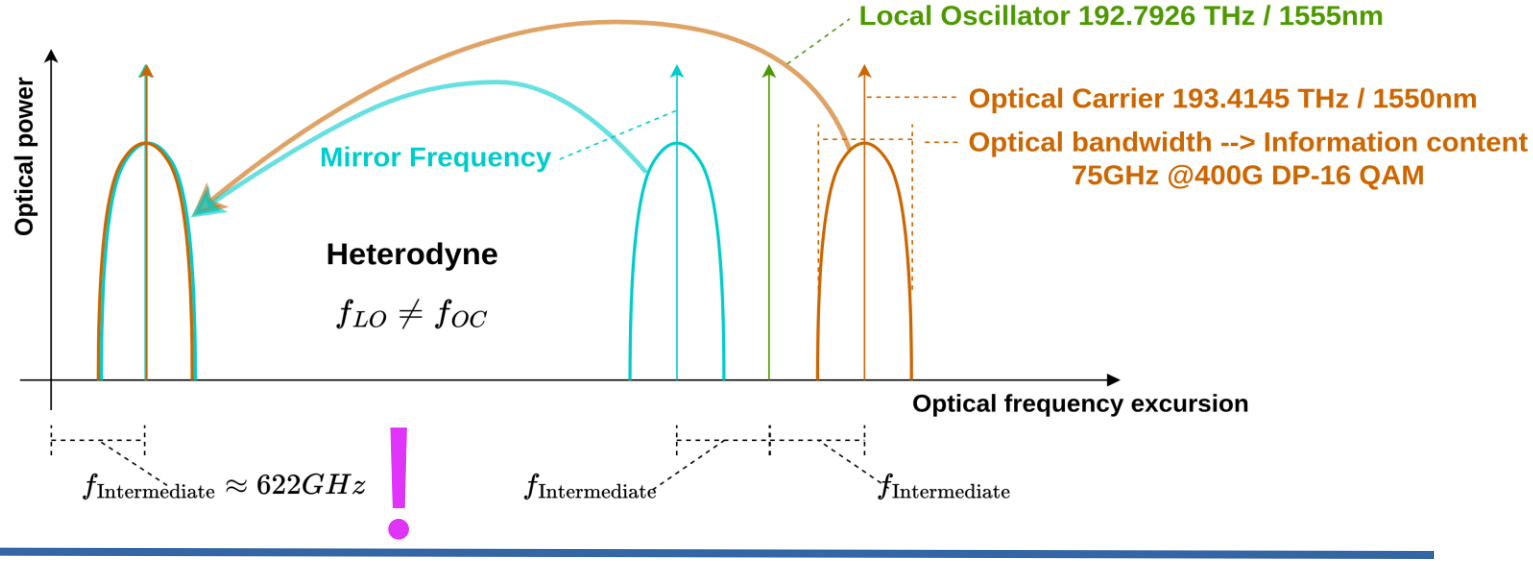


IL ~ 2dB

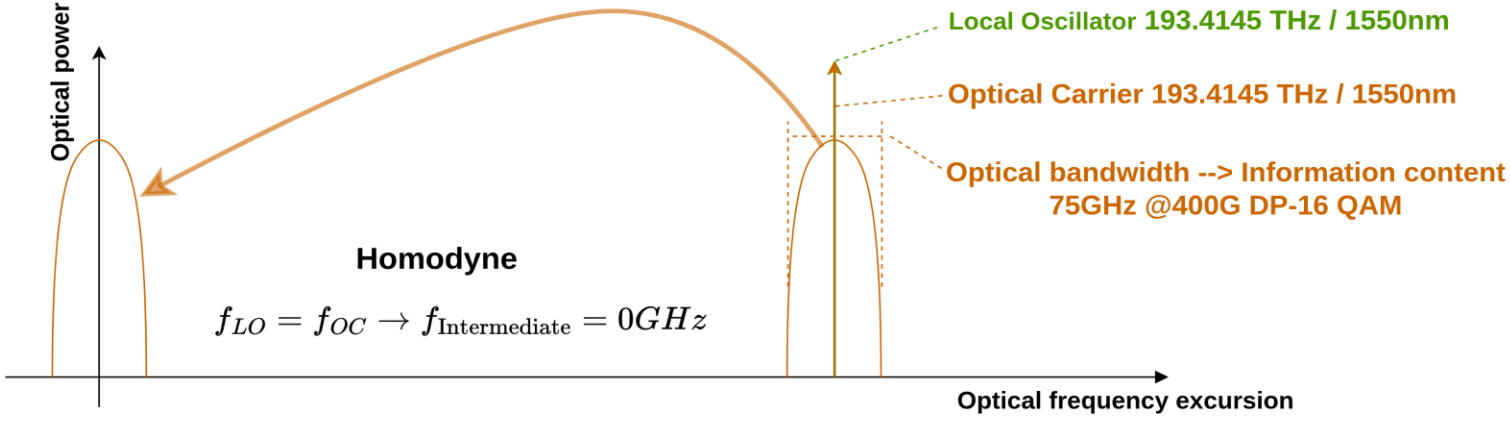
COTS = Commercial Off-The-Shelf

downconverted signal

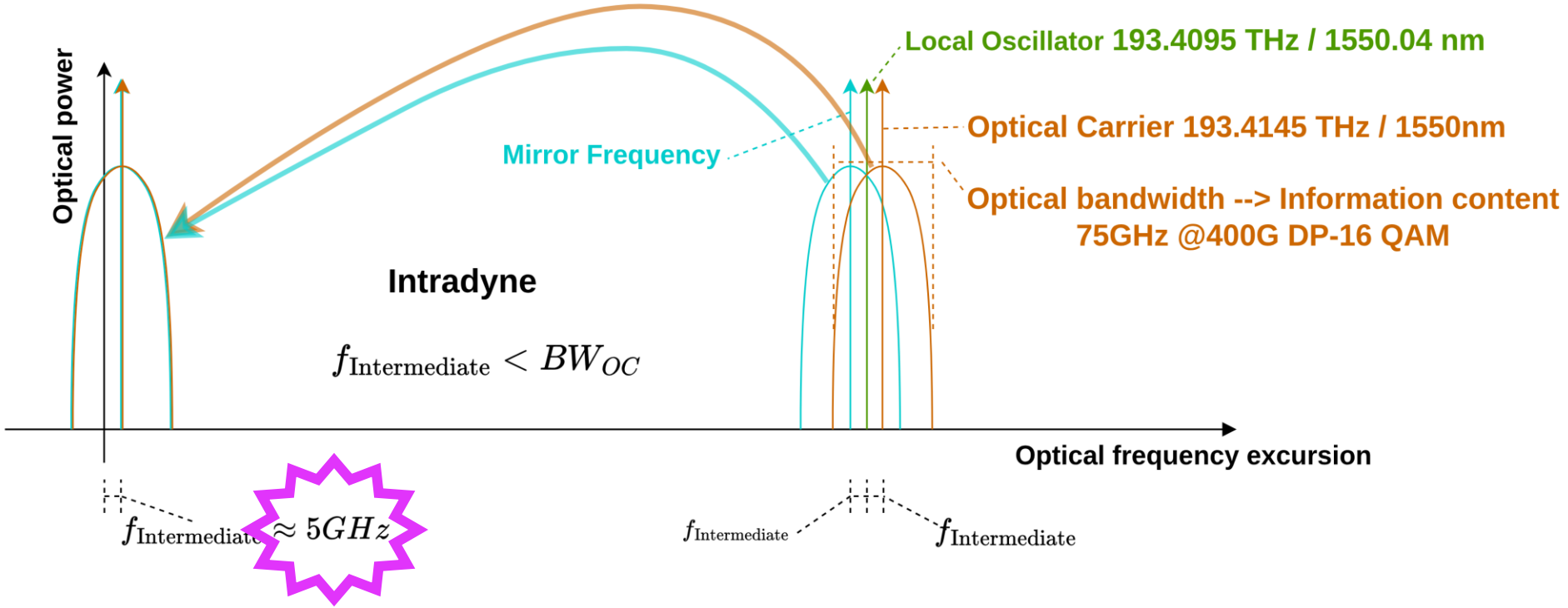
Heterodyne



Homodyne



Intradyne Detection




```
# RX signal power
```

```
# RX power
```

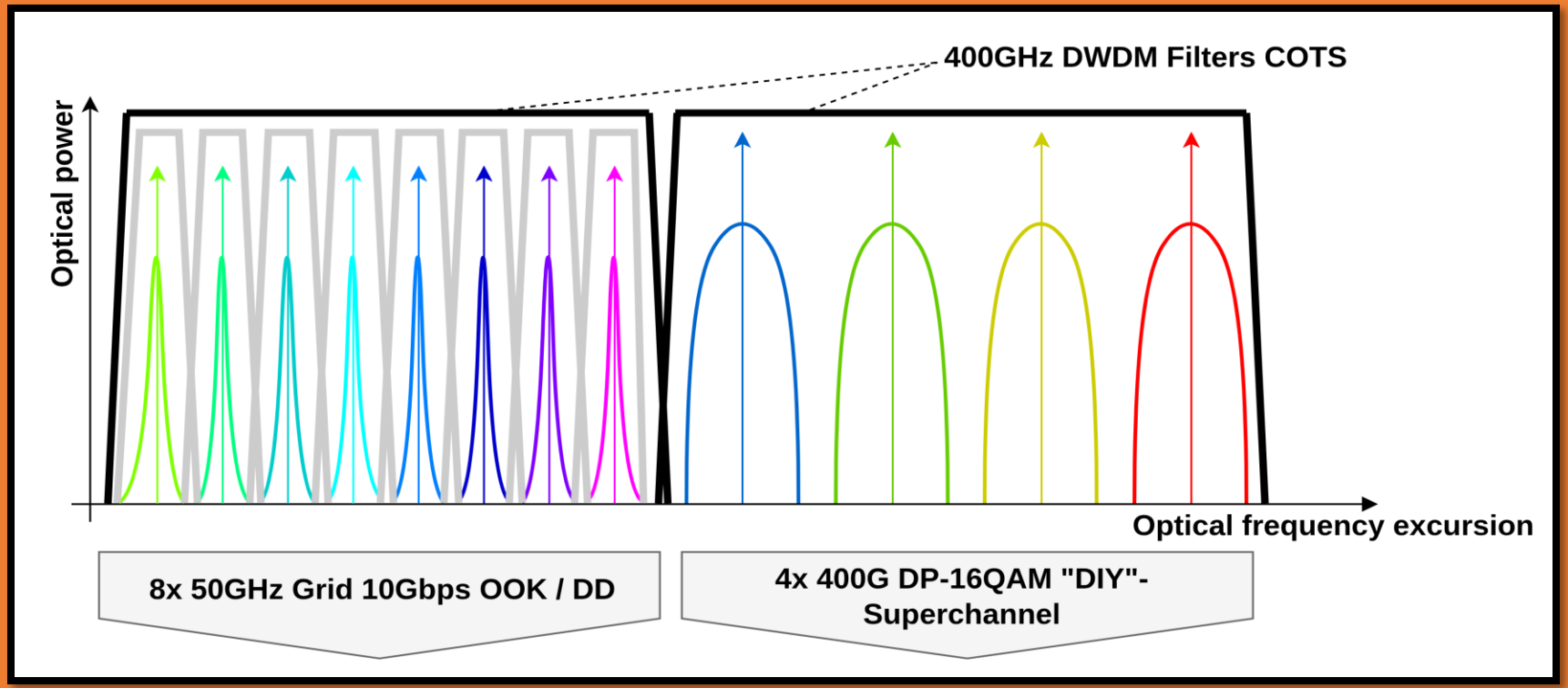
we made it

to the moon



Source: https://de.wikipedia.org/wiki/Rakete#/media/Datei:Apollo_8_Liftoff.jpg, November 2025

Coherent Detection DIY-Superchannels

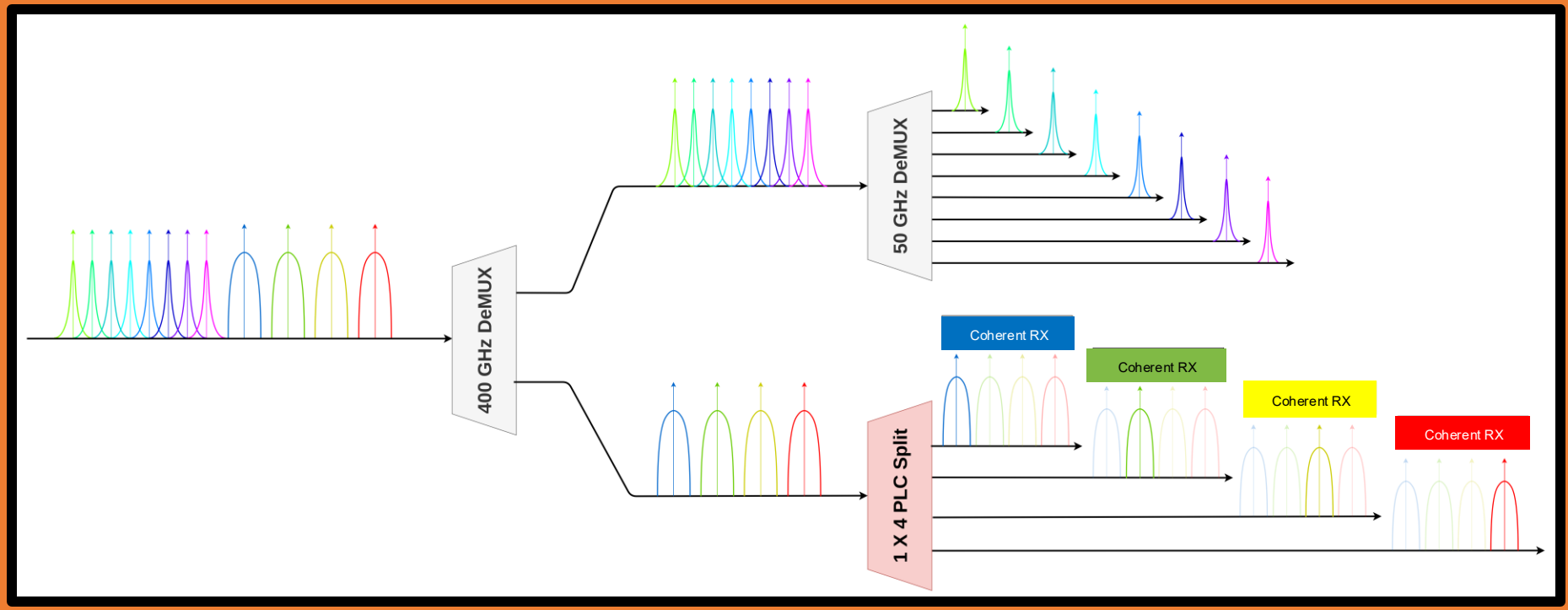


Run the subband through regular 50GHz DWDM MUX / DeMUX

Use low-cost PLC 1x4 / 4x1 splitters to combine TX and split RX

Note: Blake Willis achieved optimum performance @ 100GHz spacing

Flexible Network Architecture



hint: make a frequency plan for your spans

our way to the universe

400GHz MUXes will make your network flexible

Foundation for Colorless are Balanced-receiver

Think in **THz** and **GHz**
not in nm or channel numbers

800G Coherent ZR+
DD and OSFP is available

source: https://www.flexoptix.net/en/d-co168hg-11-ytn.html
January 2026





source: https://www.adtran.com/de-de/products-and-services/fsp-3000-ip-ols, May 2026

300GHz ADTRAN FSP 3000 IP OLS

next star: 12.8T liquid cooled XPO

source: https://xpomsa.com, March 2026

MY CONCLUSION

I can't wait for tonight's social!

one more thing



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Gert.Matyasowicz@flexoptix.net



graphics and illustrations made by the people of FLEXOPTIX, November 2025 – when sharing citation of source required



Coherent BIDI

requires a 2nd laser source for RX Local Oscillator

