

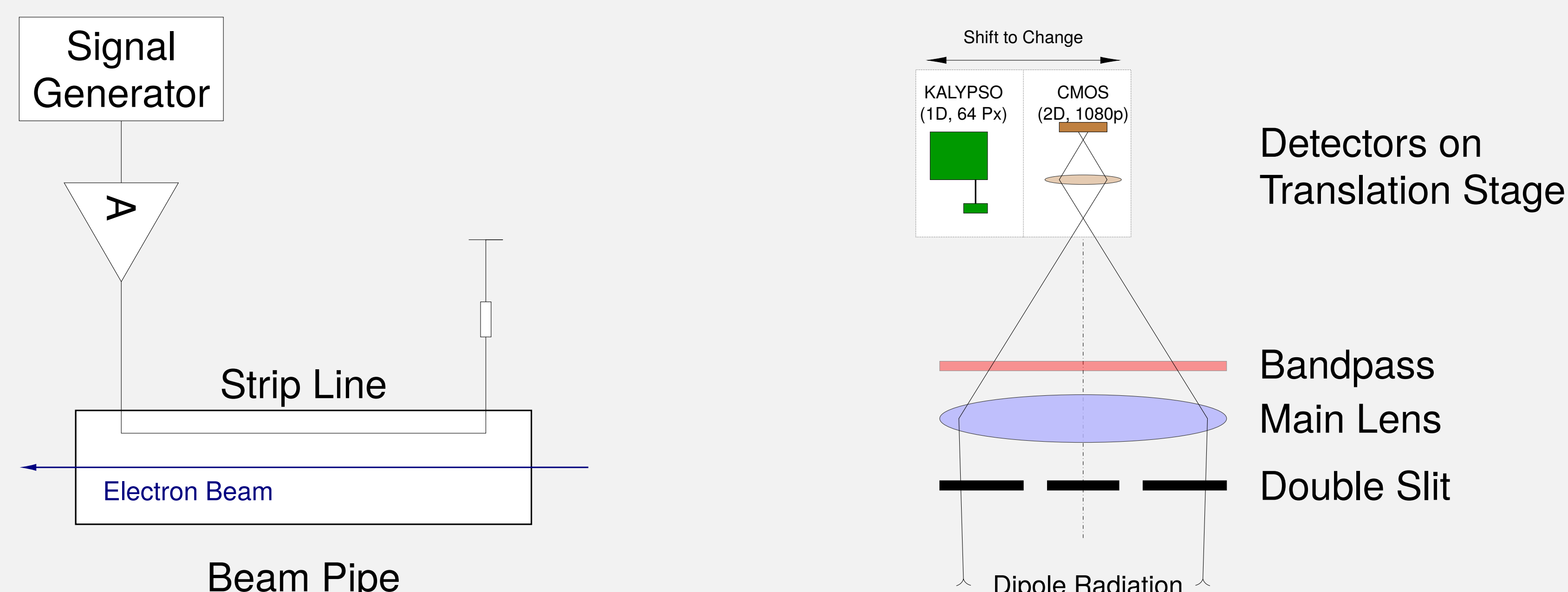
# Time-Resolved Measurements of Transverse Beam Excitation in an Electron Storage Ring

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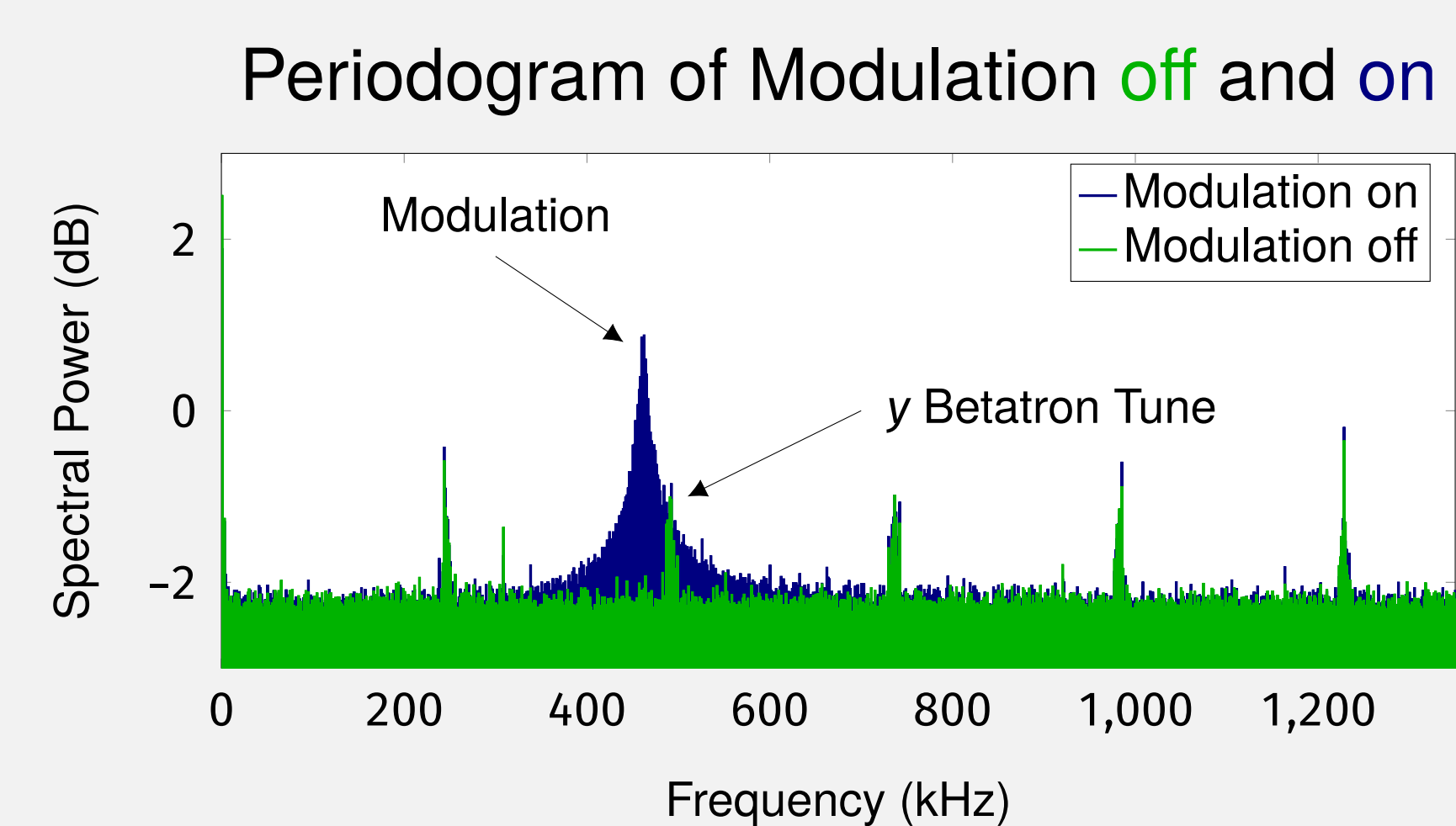
## Motivation

- Transverse modulation can increase beam size, thus reducing intra-beam scattering
- KARA vertical beam size smaller than diffraction limit
- Use double slit setup to convert size changes into contrast modulation  $V^{[1, 2]}$
- In existing setup,  $V$  is measured with CMOS camera<sup>[3]</sup>,  $\Rightarrow$  low time resolution
- Therefore sample with fast (turn-by-turn) line camera KALYPSO<sup>[4]</sup> to distinguish mere *position* modulation from desired *size* blow-up

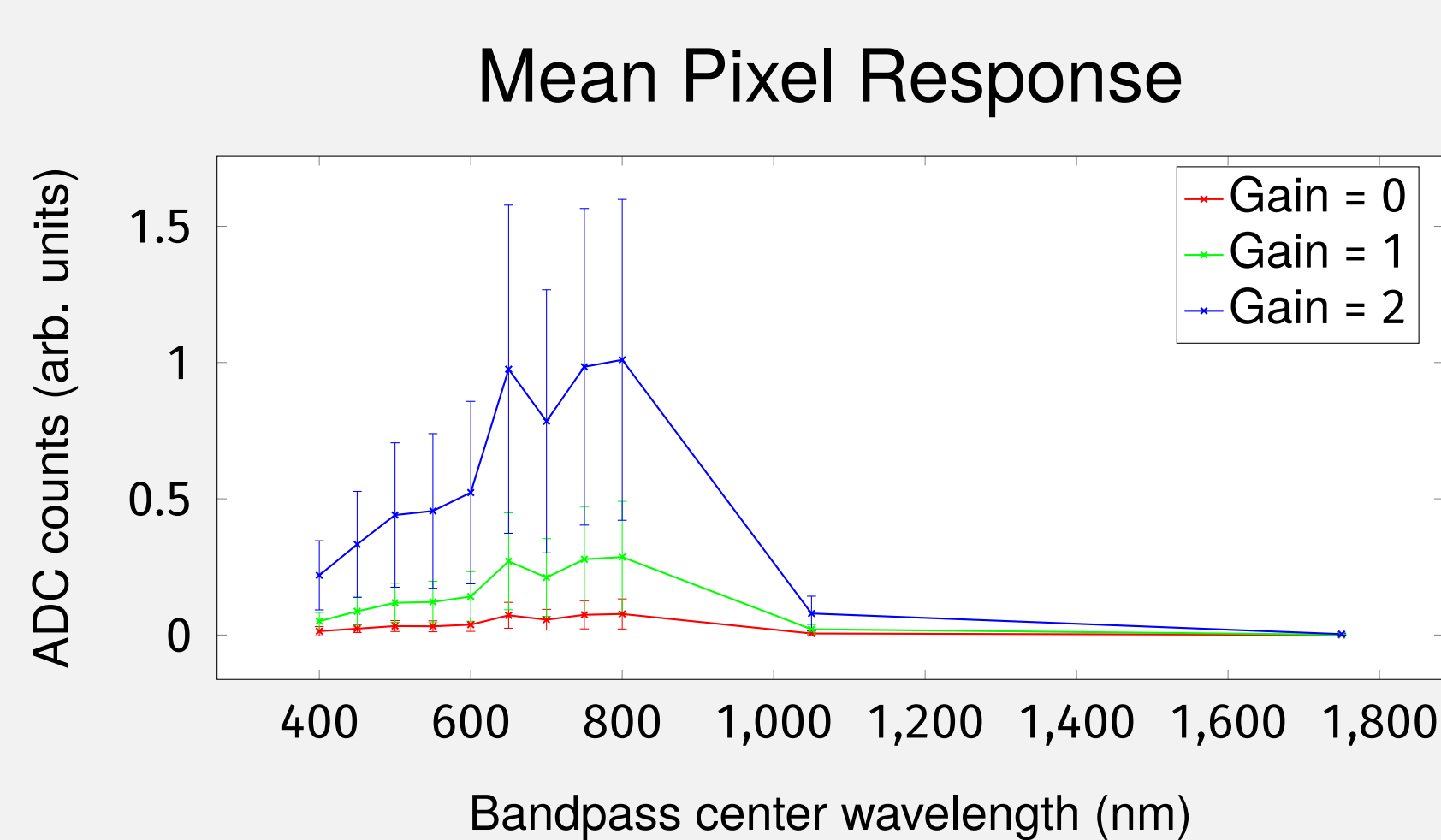
## Transverse Beam Excitation and Measurement Setup at KARA



## Characterization of the KALYPSO Turn-by-Turn(2.7 MHz) Line Camera



Response of one pixel to a beam modulation is measured without using the double slit



Spectral response measured with tungsten lamp and set of band-pass filters; Averaged over 1000 frames and all pixels

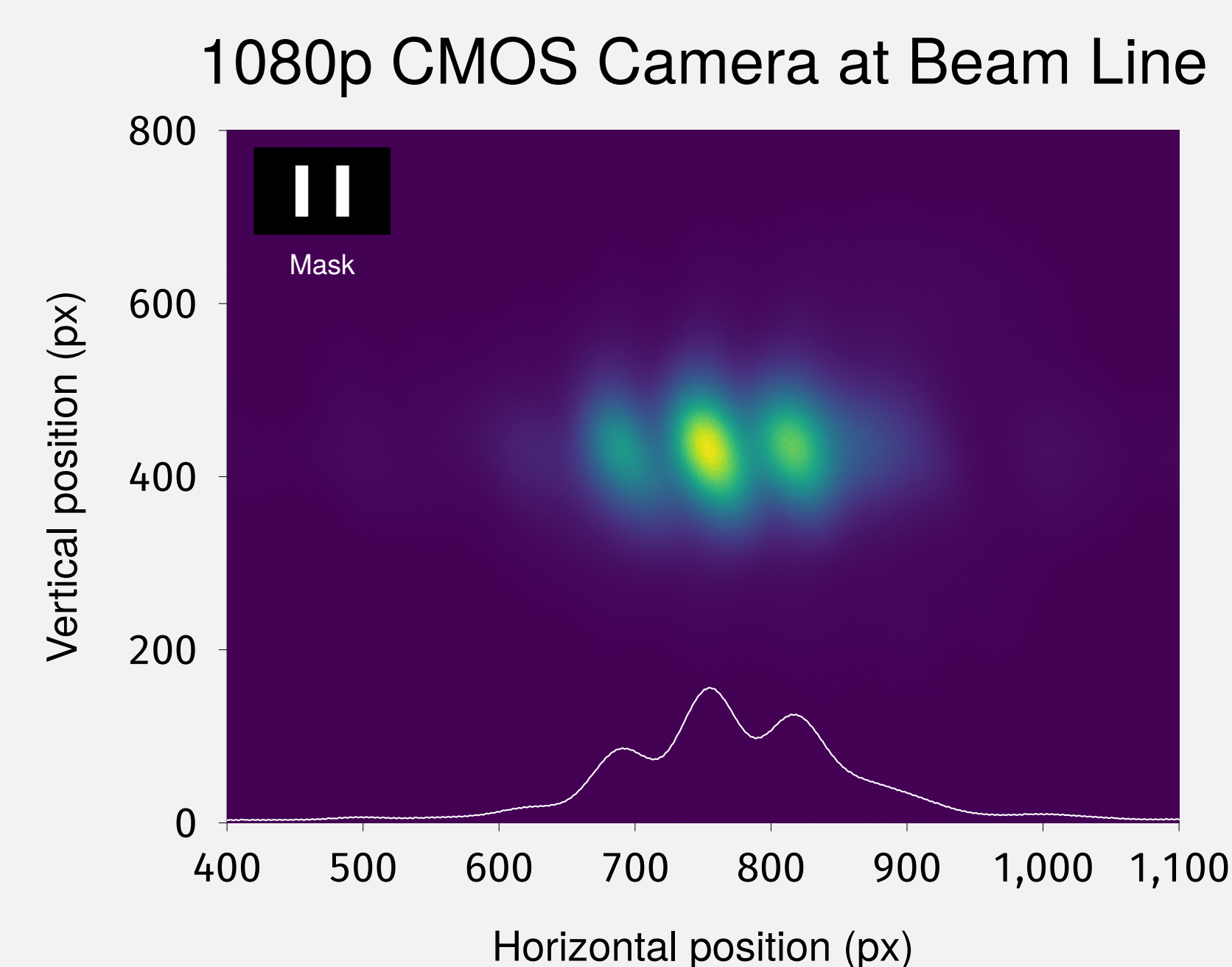
## Upcoming Upgrades

- Experiments show double slit measurements not possible due to (radiation-) damaged optics

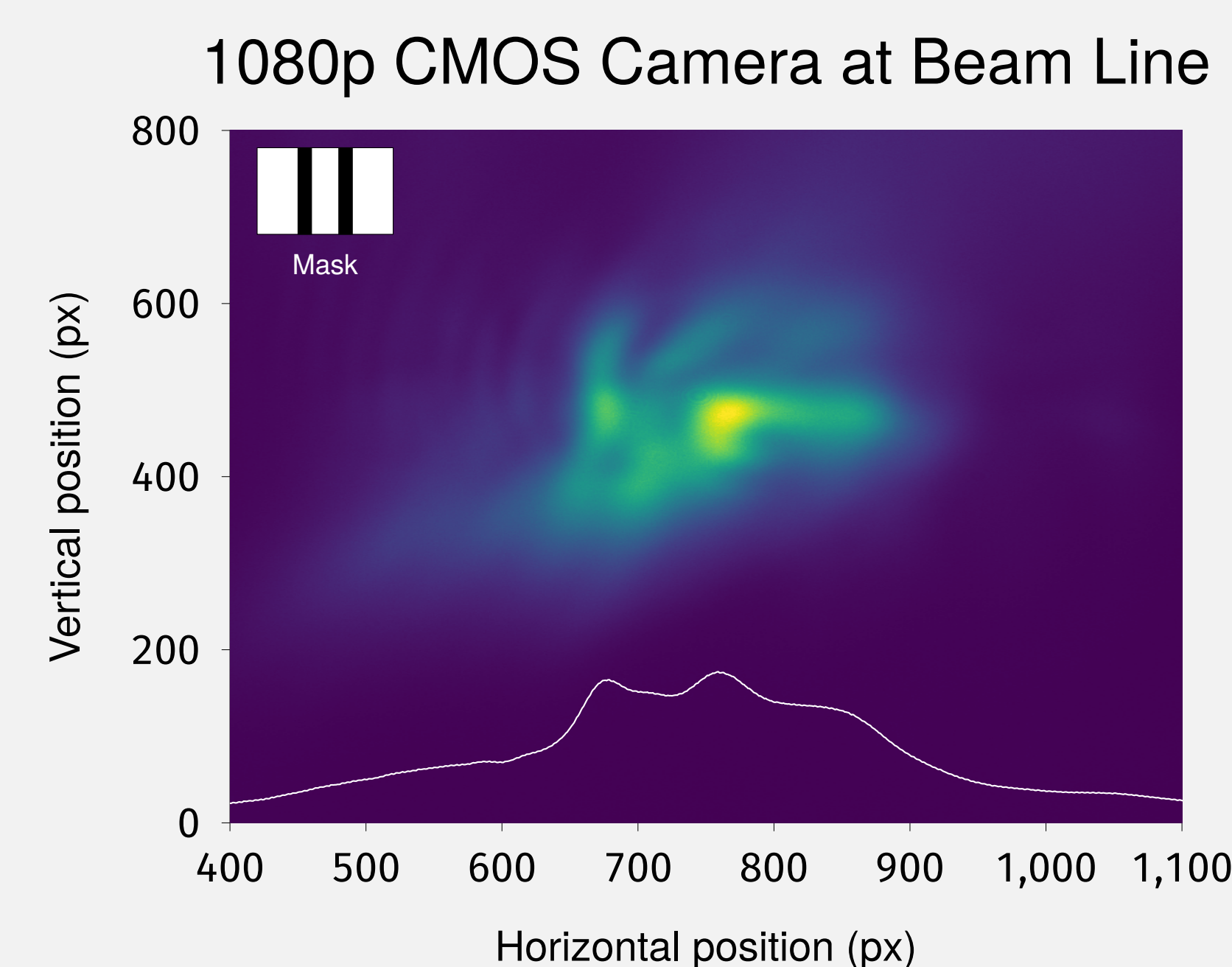


- Mirror and windows are to be replaced
- Old green bandpass filter is switched for NIR(e.g. 850 nm) filter

## Double Slit



## Inverted Double Slit



## Summary and Outlook

- Feasibility of setup shown, however limited by the low-light conditions
- Characterizations of KALYPSO show spectral response similarity to CMOS camera
- Other geometries than the double slit, e.g. an inverted version, are studied
- After KALYPSO setup is in operation, systematical studies of different accelerator operation modes (injection, energy ramp, ...) will be done

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### References

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### Conference

