

# Fiber optic source for extended dynamic range

## Background

Optics is the main driver in technology development and applications [1] ranging over 20 orders of magnitude dynamic range from quantum technologies at the few photon regime to laser cutting and welding applications in the tenth of kW power range. There is not one standard source or detector that can cover such wide dynamic range and this represent a technology barrier in the calibration of various detectors in the extreme ends of the dynamic range. Justervesenet (JV) has references based on photodiodes. Photodiodes are cheap, uniform, fast, stable and maintain their response over a wide dynamic range from mW to fractions of pW.

JV wants to establish and maintain a flexible service for Norwegian customers based on photodiodes covering an extended dynamic range of optical power calibration. We would like to explore the achievable uncertainty using a new reference fiber source based on fiber optic splitter and attenuators to cover an increased dynamic range in our services.

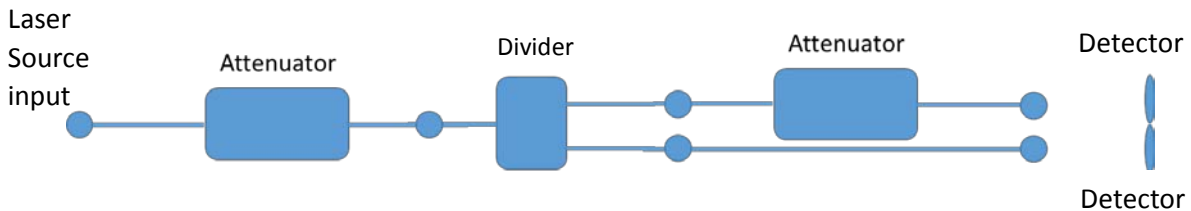


Figure 1. Schematic layout of standard source based on well-characterized dividers and attenuator for extended dynamic range calibrations and detector characterizations.

## Task

Evaluate suitable spectral ranges for various types of optical fibers and dividers. Further examine possible methods of making flexible attenuators. Based on the preliminary study, purchase dividers, fibers and components for making attenuators. Characterize the various components for stability, polarization sensitivity and repeatability to explore the achievable spectral range, dynamic range and their associated uncertainty.

## Additional information

The task is suitable for one or two dedicated persons for research project and master study. The master study has to be done in JV's laboratory at Kjeller.

## Contact person

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## References

- [1] <https://www.photonics21.org/download/about-us/photonics-ppp/photonics-roadmap.pdf?m=1513605711&>