

KRISS Photometric Unit (Candela): Key Achievements and Strategic Research Directions

Name SeonDo Lim, DJ Shin, SK Kim, DH Lee, SJ Park, JS Hwang, IH Bae, KH Lee, Division of Physical Metrology, Korea Research Institute of Standards and Science (KRISS)
E-mail sdlim@kriss.re.kr

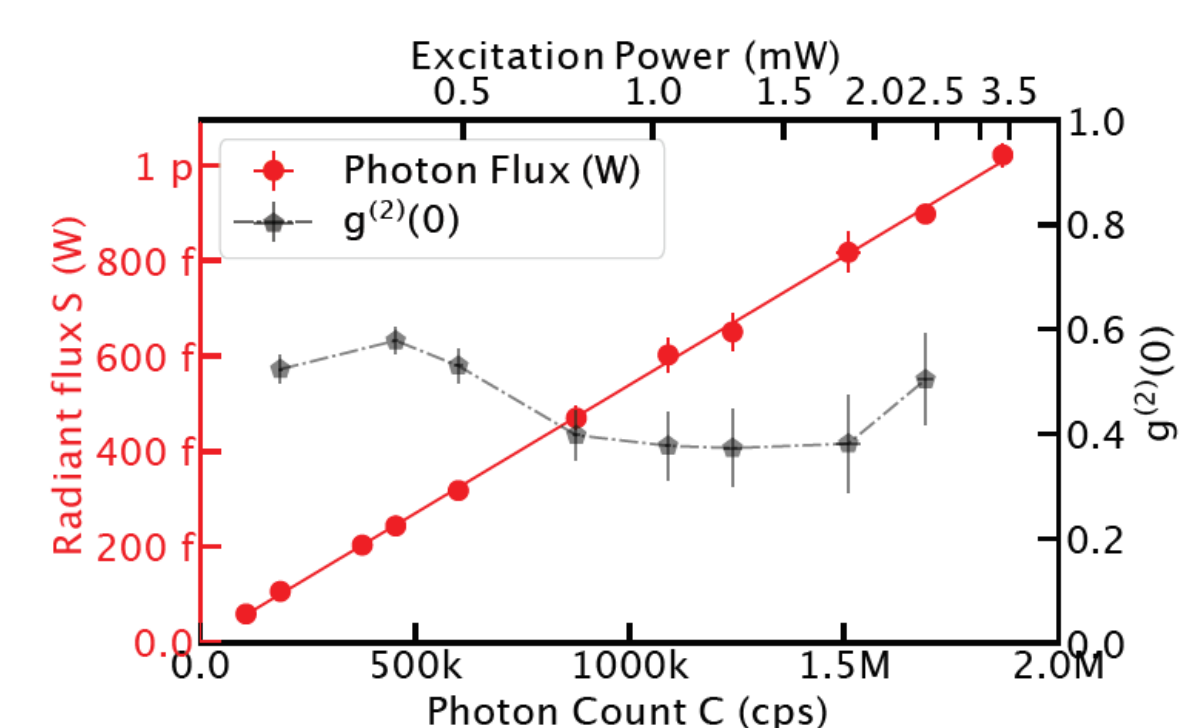
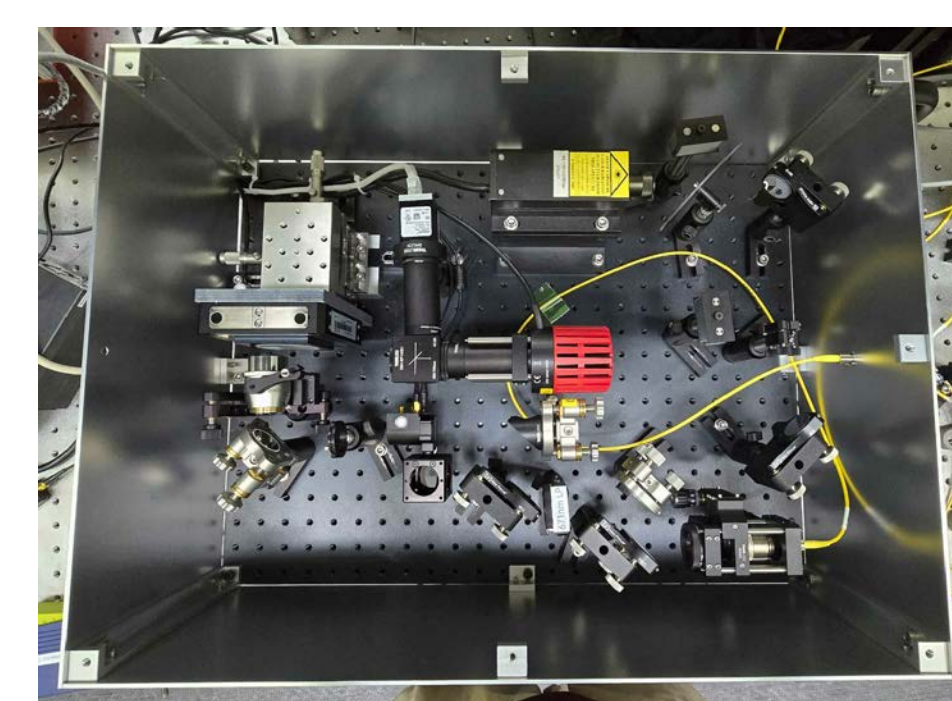
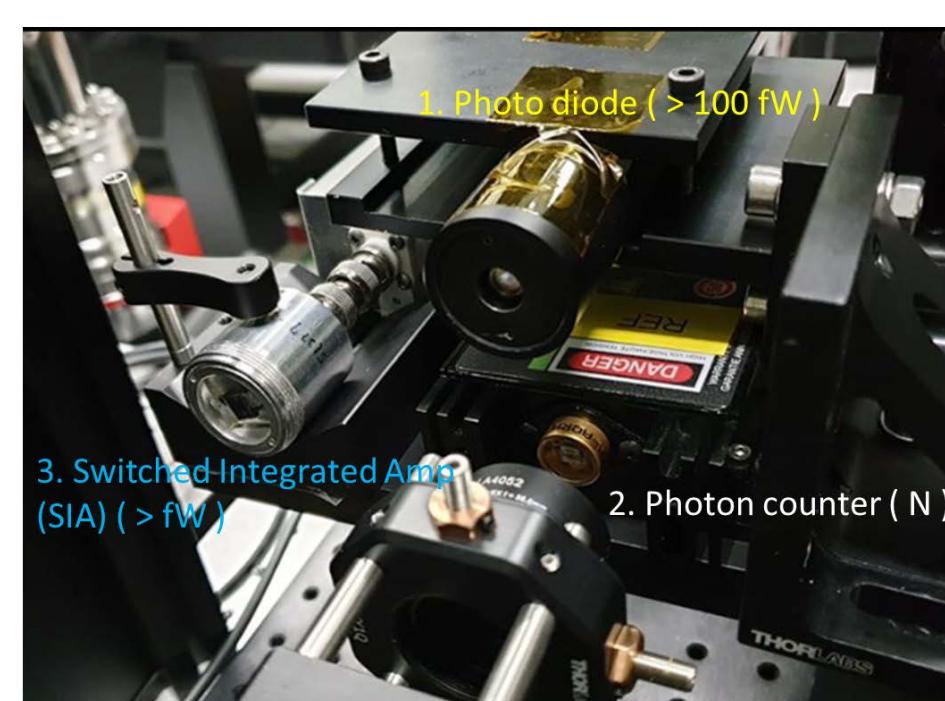
Introduction to KRISS Photometry and Radiometry Group

● SI unit – Candela and other derived units in photometry and radiometry¹⁾

Staff (as of 2025)	Calibration and Measurement Capability (CMC)
Researcher : 9 (Ph.D)	Total CMC Entries: 54 / 28 (excluding duplicated quantities)
Technician : 3	Global Ranking in terms of CMC number : 6 th
International Comparison	Measurement Services
CCPR KC : 7	Service Volume : Approximately 730 / year
RMO KC and SC : 11 (APMP 9, COOMET 1, EURAMET 1)	Revenue : Approximately 0.5 M USD / year

Photon-number based Candela

● Single-photon Source Metrology²⁾



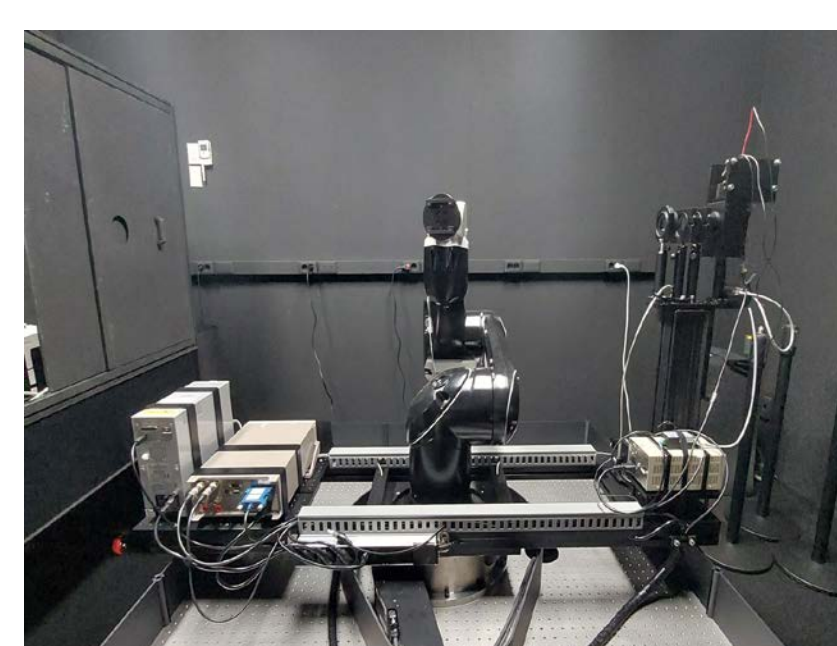
- **Highly stable and bright single-photon source**
 - Narrow linewidth (< 2 nm) and high purity ($g(2) < 0.1$)
 - Developed using hBN nano material
 - Compared using a traceable SPAD detector
 - Room-temperature operation
 - 19-inch rack compatibility and portability (under 20 kg)
 - Single-mode fiber output
 - Plug & Play functionality

Brand-new Primary Standards

● Optical power, 3D-BRDF, and Spectral responsivity



Optical power (W)
Absolute Cryogenic Radiometer



3D-BRDF
Controlled Robot Arm

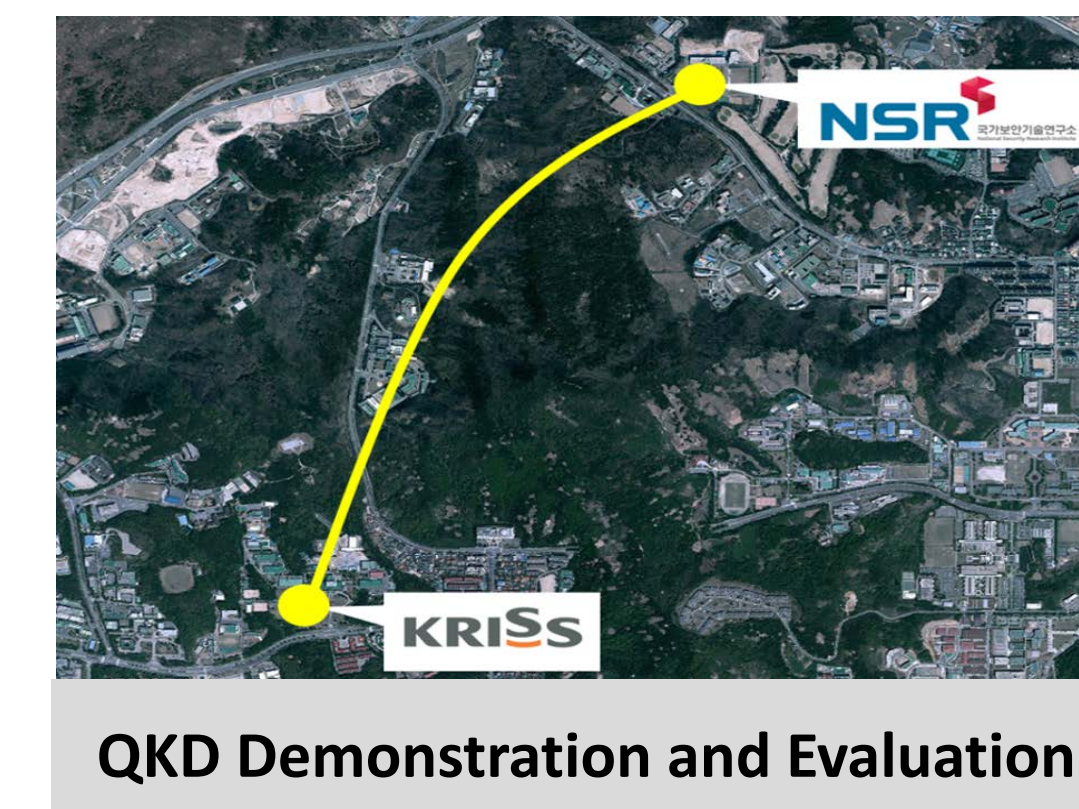
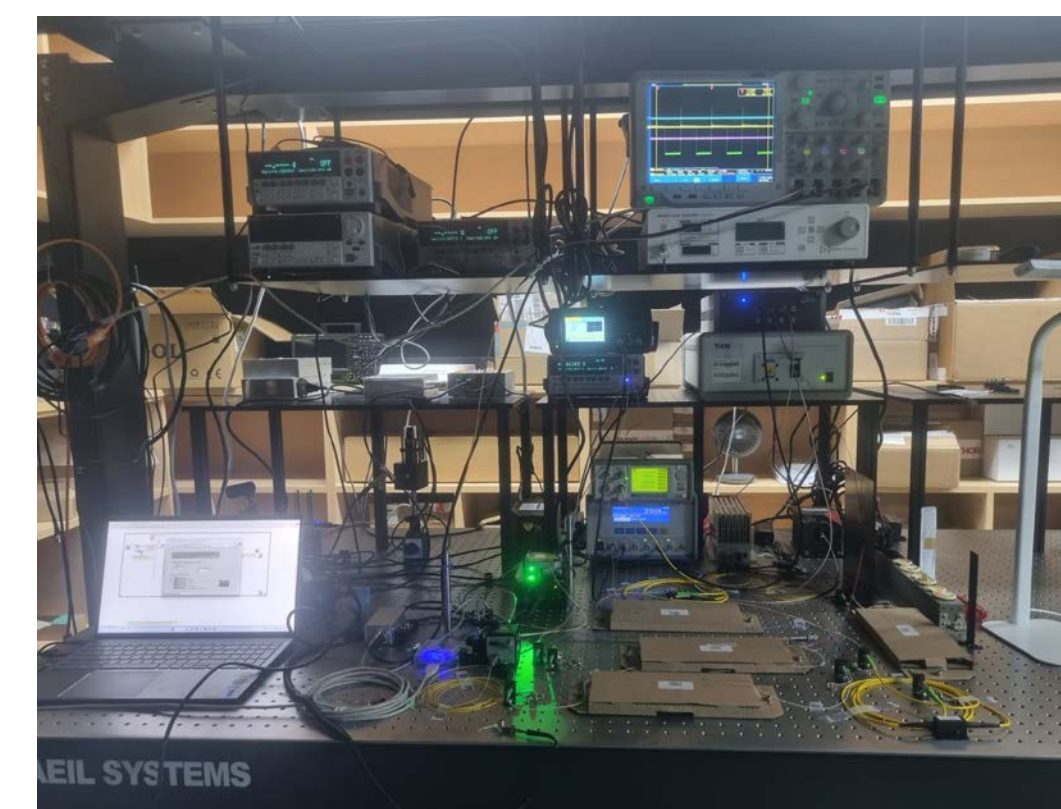


PQED-based Spectral Responsivity

KRISS Quantum Metrology

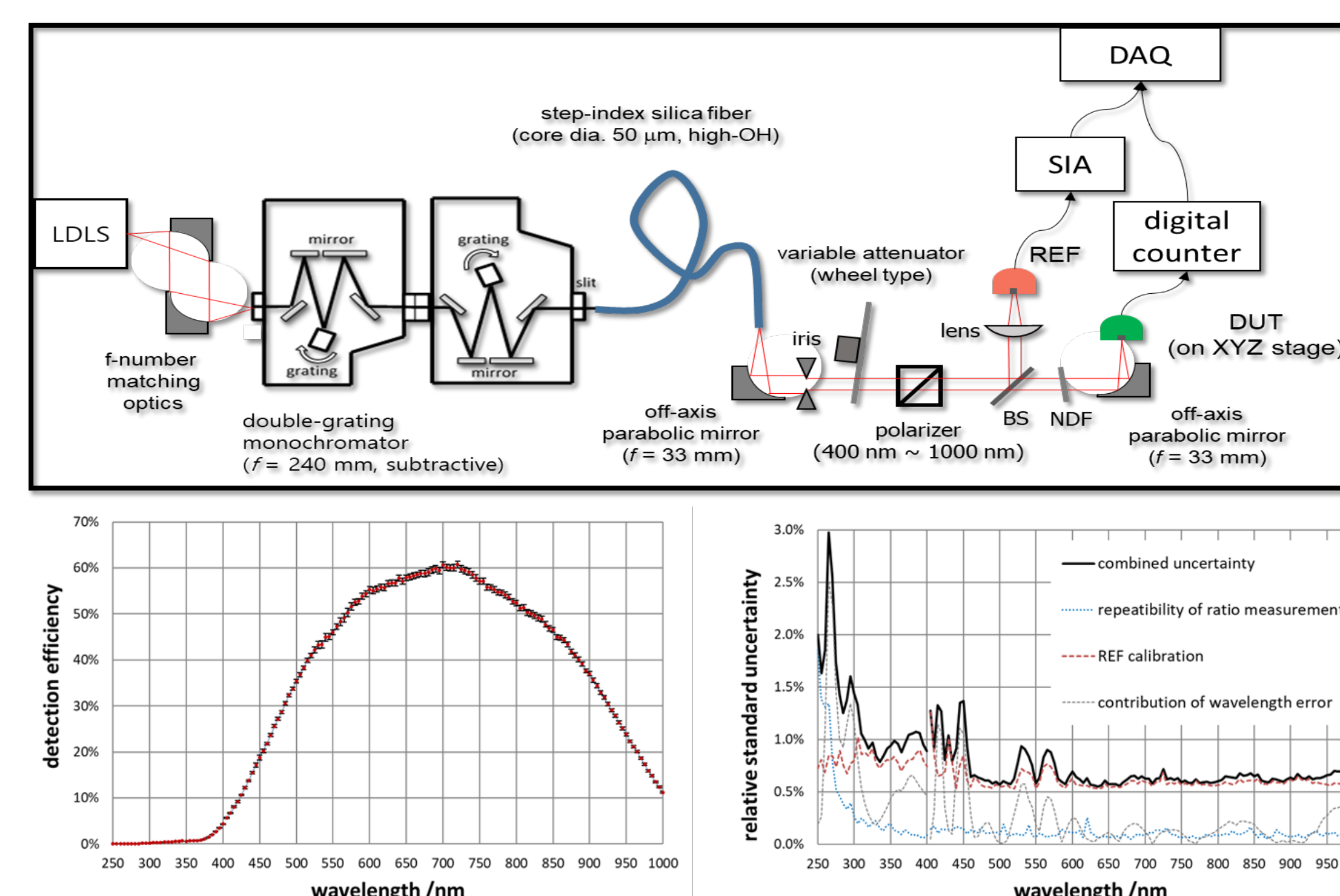
● National Quantum Testbed Center

- Open labs for quantum industry and QKD test services



● Single-photon Detector Calibration

- DE of SPAD from 250 nm to 1000 nm



Global Leadership and Partnership

● Chairing Key Committees in PR Standards

- Previous chair of CCPR WG-KC and WG-SP-TG7 (Few-Photon Metrology)
- Current chair of CIE Division 2 (Physical Measurement of Light and Radiation)
- Former chair of APMP TCPR

● Commercializing Candela through Licensing and Entrepreneurship

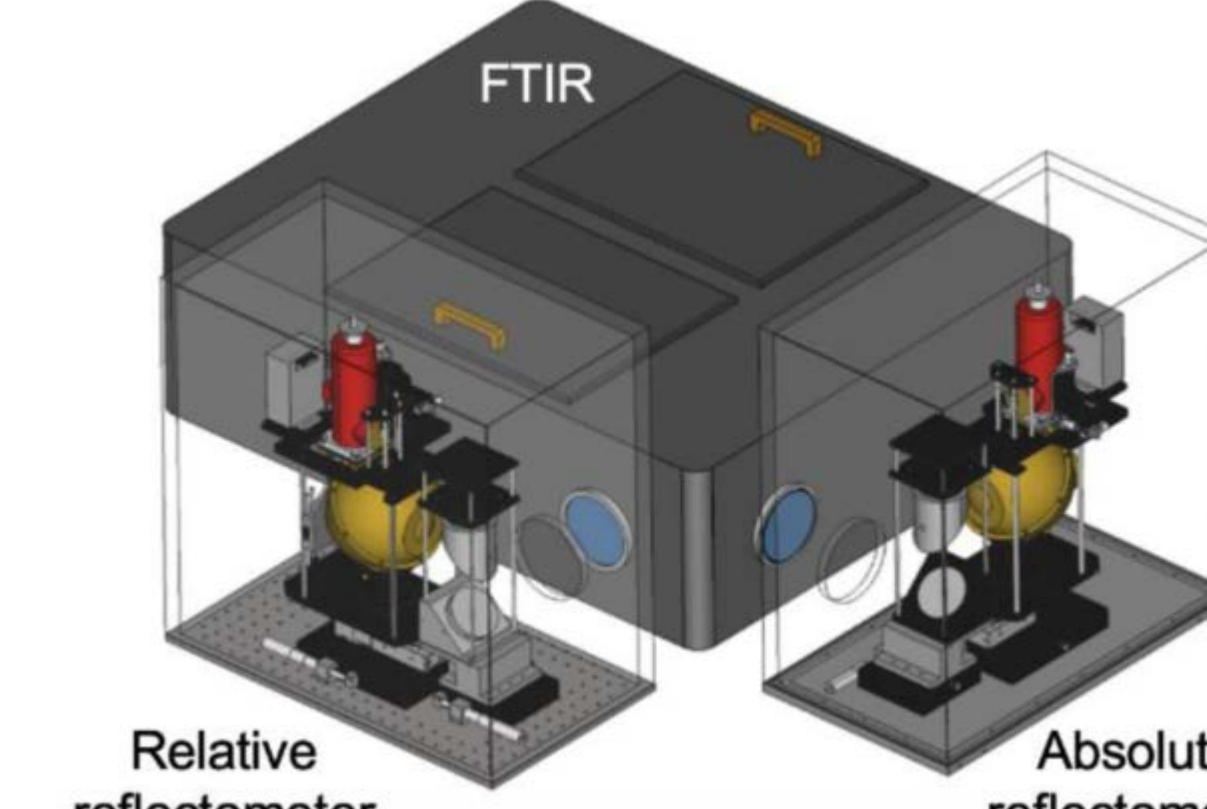
QRAD for Quality in Optical Radiometry

QRAD Inc. is a start-up based on the measurement technologies of KRISS and provides unique solutions in optical radiometry and photometry.

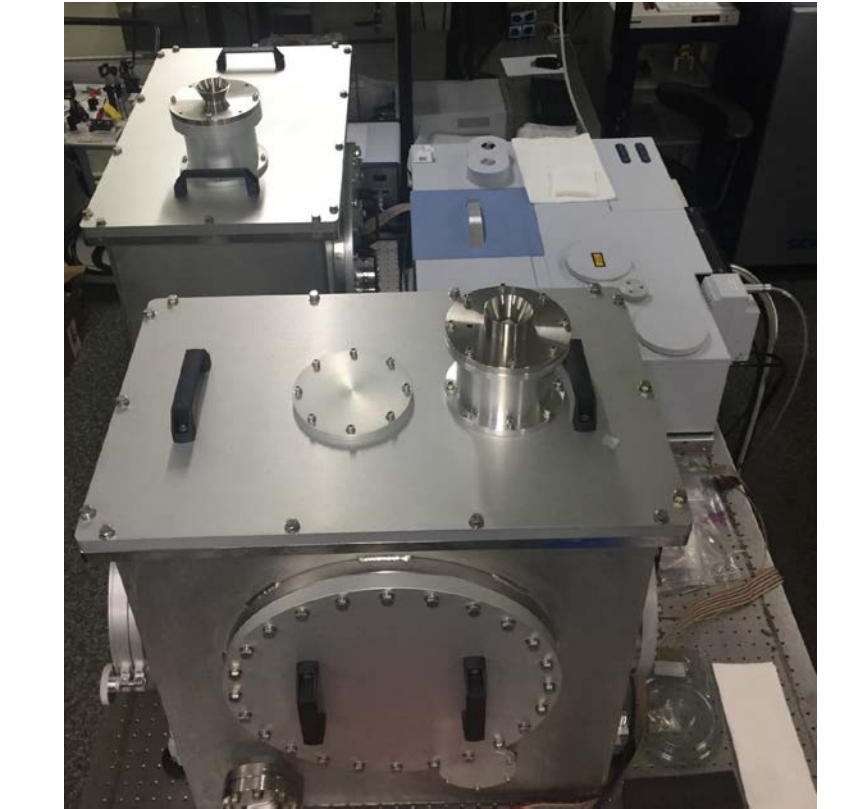
Space and Defense Metrology

● Measurement Capability Expansion to the Mid-wave Infrared³⁾

- Primary reflectance standard in MWIR (Third-Taylor method)



Relative reflectometer



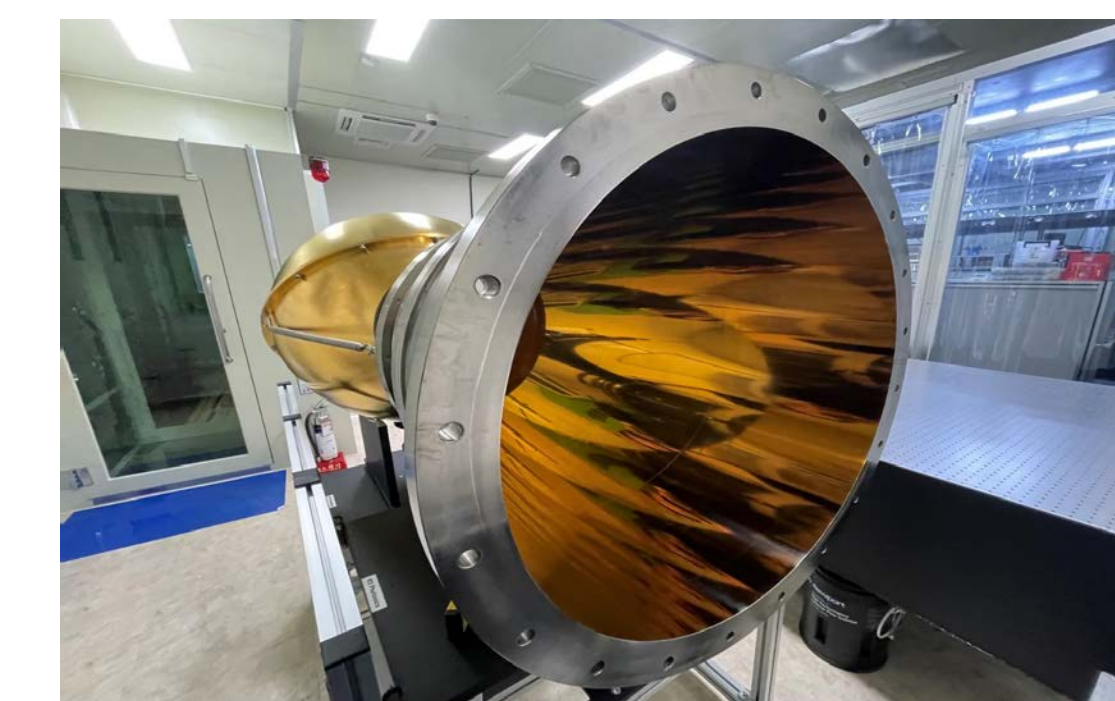
Absolute reflectometer

● Collaboration with National Agencies for Space Metrology

- Reference targets for vicarious calibration of national satellites in MWIR



● Large-aperture reference spectral radiance source for NASA SPHEREx mission



Reference

- [1] https://www.kriss.re.kr/departementEngWeb/departement2deptsView.es?mid=a20801010100&kd2_code=1000013
- [2] <https://doi.org/10.1002/lpor.202401966>
- [3] <https://www.mdpi.com/1424-8220/21/4/1169>



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