

## Summary report of recent PTB thermometry activities

### Research activities

- Determination of the Boltzmann constant with lowest uncertainty using a non-acoustic method, namely dielectric constant gas thermometry, for the kelvin redefinition
- Low uncertainty determination of  $T-T_{90}$  between 30 K and 200 K using dielectric constant gas thermometry as basis for preparing a new recommendation for the function  $T-T_{90}$  versus  $T_{90}$  in the low-temperature range by CCT-WG-CTh
- Determination of gas properties of noble gases (helium, neon and argon) for the use in primary thermometry
- Development of a new setup for primary magnetic field fluctuation thermometry
- Measurements of thermodynamic temperatures by means of CSNT and pMFFT at temperatures below 20 mK
- Validation of improved primary thermometers (pMFFT, CSNT, CBT) for the temperature range from 0.9 mK to 1 K, as a basis for the inclusion into the *Mise en Pratique* for the definition of the kelvin in the SI
- Investigation of the hysteresis and oxidation-related drift of Standard Platinum Resistance Thermometers
- Development of optimal Pt-Rh thermocouples for temperatures above 1100 °C
- Investigations on photonic thermometry with photonic integrated circuits
- Research on high-temperature photonic thermometry by means of sapphire fibre Bragg grating thermometers

### CCT-WGs, -TGs and -documents

- Lead CCT-WG-CTh and active participation in CCT-WG-KC, CCT-WG-Env, CCT-WG-HU, CCT-WG-SP, CCT-WG-NCTh, CCT-TG-NCTH-BTM, CCT-TG-CTh-ET, CCT-TG-GoTh, CCT-TG-ThQ, TG-SMFPC and the TG for the promotion of the SI
- Lead of the final work to the *MeP-K* and the Guide to the realization of the ITS-90 and contributions to the
  - Published guide on secondary fixed points
  - Guides on general thermocouple thermometry (in progress) and the guide on reference thermocouples (in progress)
  - Uncertainties in the realisation of ITS-90 metal freezing points using sealed cells

### Comparisons

Participation in CCT-K9, CCT-K9.1, local pilot in EURAMET.T-K9, CCT-K8, COOMET-T-K9.1, COOMET.T-S4

### Publications

<https://www.ptb.de/cms/en/ptb/fachabteilungen/abt7/fb-74/publ-fb-74.html> and  
<https://www.ptb.de/cms/en/ptb/fachabteilungen/abt7/fb-73/publ-fb-73.html>