

AEROSOL METROLOGY FOR ATMOSPHERIC SCIENCE AND AIR QUALITY: THE AEROMET PROJECT

Paul Quincey^{1,*}, Konstantina Vasilatou², Alfred Wiedensohler³, Stefan Seeger⁴, Luca Boarino⁵, Petr Klapetek⁶, Kai Dirscherl⁷, Francisco Moreno⁸, Peter Pedersen⁹, Thomas Pedersen¹⁰, Matjaz Zitnik¹¹, Jeanne Malet¹², Jenny Rissler^{13,14}, Francois Gaie-Levrel¹⁵, Szabina Torok¹⁶, Markus Fiebig¹⁷, Maria Ochsenkühn-Petropoulou¹⁸, Luca Stabile¹⁹, Michele Laus²⁰, Armin Gross²¹, Burkhard Beckhoff²²

¹ National Physical Laboratory, Teddington, UK
² METAS, Wabern, Switzerland
³ TROPOS, Leipzig, Germany
⁴ BAM, Berlin, Germany
⁵ INRIM, Turin, Italy
⁶ CMI, Brno, Czech Republic

⁷ DFM, Hørsholm, Denmark
⁸ CIEMAT, Madrid, Spain
⁹ DTI, Taastrup, Denmark
¹⁰ FORCE, Brøndby, Denmark
¹¹ JSI, Ljubljana, Slovenia
¹² IRSN, Fontenay-aux-Roses, France

¹³ Lund University, Sweden
¹⁴ RISE, Stockholm, Sweden
¹⁵ LNE, Paris, France
¹⁶ MTA-EK, Budapest, Hungary
¹⁷ NILU, Kjeller, Norway
¹⁸ NTUA, Athens, Greece

¹⁹ UNICAS, Cassino, Italy
²⁰ UPO, Vercelli, Italy
²¹ Bruker Nano, Berlin, Germany
²² PTB, Berlin, Germany



*Corresponding e-mail: paul.quincey@npl.co.uk

MOTIVATION:

- Air pollution is the leading cause of environmentally related severe health effects and inhalable Particulate Matter (PM, Aerosols) is the largest contributor. Based on 2012 air pollution produced almost 600 000 premature deaths in the EU and estimated overall annual economic costs stood at US\$ 1.575 trillion. (WHO 2012).
- Effectiveness of EU wide countermeasures against air pollution depend on excellence of air quality metrology.
- This project lays the foundation and strengthens metrological frameworks for air quality monitoring in Europe.

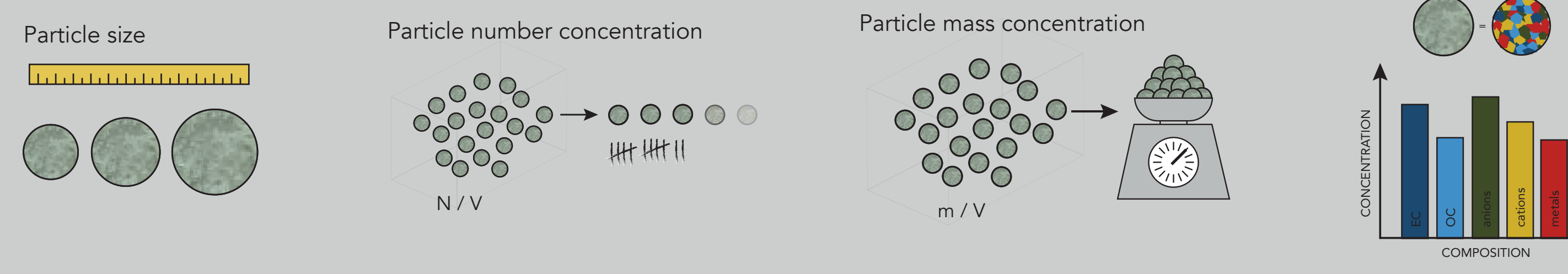
THE NEED

- Improvement of accuracy, flexibility and traceability of methods requested by air quality monitoring networks, regulatory bodies and manufacturers
- Improved comparability of optical and gravimetric methods for PM₁₀ and PM_{2.5} measurements
- Provision of calibration facilities for size and number concentration of ultra fine particles as required by CEN/TS 16976
- Establishing of advanced methods with improved traceability and sensitivity for aerosol composite analysis
- Implementation of in-field sampling and traceable real-time compositional analysis into existing stationary air quality monitoring networks

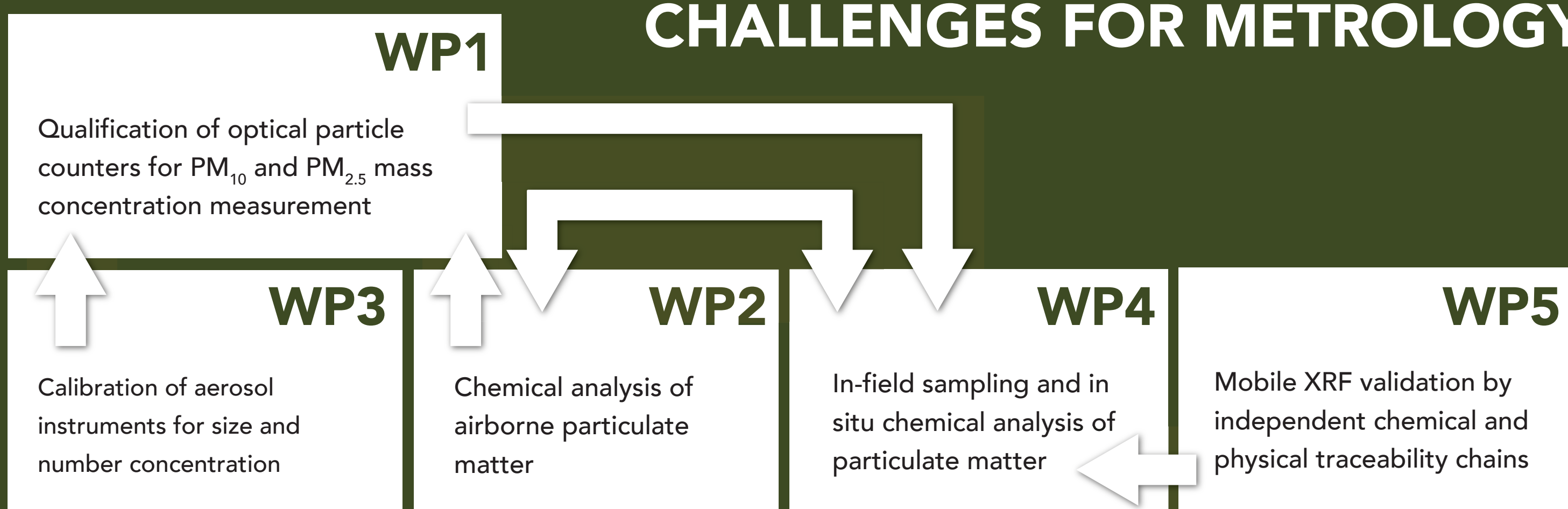
OBJECTIVES

- Development of laboratory-based reference methods for PM₁₀ and PM_{2.5} (independent aerosol mixing chamber system)
- Traceable quantification of regulated aerosol components with very high detection sensitivity
- Development of UFP calibration procedures and infrastructure for MPSS and CPCs facilities (number concentration and particle size)
- Application of mobile XRF for in-field aerosol sampling & compositional analysis, validated by traceable methods
- Uptake of technology and measurement infrastructure implemented by stakeholders such as accredited labs, standardisation bodies and instrument manufacturers

MEASURANDS



CHALLENGES FOR METROLOGY



CREATING EXCELLENCE

IMPACT

- New lab-based calibration procedure of PM-measuring instruments has direct impact on the revision of standards within CEN TC 264 WG 15
- Traceable compositional analysis has direct impact on the revision of standards within CEN TC 264 WGs 14, 34 and 35
- Substantial investment by unfunded partners and 10 LOS: Impact on industrial and user communities like air quality network, AQUILA, and on metrological and scientific communities through organisations such as ACTRIS and CCQM

WIDER IMPACT

Despite of recent efforts air pollution remains a very serious problem in the EU. Advanced aerosol metrology and capabilities, as created by this JRP, strengthen the tools for air quality regulators and politics to effectively address air quality issues and to minimize related restriction in the quality of life in the future.

GENERATING IMPACT (WP6)

- Good practice guides / Standard operation procedures
- Technical reports
- Reference materials
- CCQM study
- Input to national, EU and international standardization bodies



- Linking with Aquila & ACTRIS
- Extension of existing information infrastructure between instrument manufacturers, air quality networks and stakeholder group



STRONG STAKEHOLDER COMMUNITY



Knowledge transfer:

- Tutorials at relevant European events (e.g. E-MRS)
- Metrology training with industrial participation: interlab comparison, calibration infrastructure, field campaigns



Metrology training

Dissemination:

- High-profile publications
- Organisation of conferences, workshops and symposia
- JRP-Website



Workshops

MANAGEMENT AND IMPLEMENTATION - Effective involvement and interplay of relevant key actors with complementary expertise and competences

