

# CEM Activities Report 2018-2021

## Main research and development activities

- Development of a deadweight force standard machine from 1  $\mu$ N up to 100 N (ongoing project).
- Development of a hydraulic force standard machine up to 10 MN (ongoing project).
- Development of a deadweight torque standard machine up to 10 kN·m (ongoing project).
- Development of an electrostatic balance as a primary reference for mass (new project).
- Participation in the European project: [EMPIR 18SIB08](#), "Comprehensive traceability for force metrology services"
- Participation in the European project: [EMPIR 18SIB04](#) "Towards quantum-based realisations of the pascal"

## List of Publications

- "EURAMET.M.D-S3: Solid density comparison", *Metrologia* 55 07012
- "Magnetic field influence in deadweight force standard machines: a practical case", *Journal of Physics: Conference Series*, Volume 1065 (2018)
- "Study of influences in CEM's new transfer standard for torque measurements in the MN·m range", *Journal of Physics: Conference Series*, Volume 1065 (2018)
- "Legal requirements for NAWIs: are they good enough for customers' protection?", *Journal of Physics: Conference Series*, Volume 1065 (2018)
- "Un nuevo sistema para la medición del par en aerogeneradores" *Revista e-medida*, nº 14, diciembre 2018
- "2019: la redefinición del kilogramo en el SI revisado" *Revista e-medida*, nº 14, diciembre 2018
- "A Metrological Characterization Approximation for the New Torque Measurement System in Wind Turbines Test Benches", *IEEE Access* (Volume: 7) 73469 – 73479, DOI: 10.1109/ACCESS.2019.2920261
- "Gestión de proyectos internacionales - programa EMPIR 2014: una experiencia española", *Proceedings from the International Congress on Project Management and Engineering CIDIP 2019*.
- "Development of the new 10 kN·m torque standard machine at CEM", *Procedia Manufacturing* 41 (2019) 1039–1046.
- "Methodology for managing traceability in the measurement of torque in wind generators", *Procedia Manufacturing* Volume 41, 2019, Pages 336-342.