Visiting Scientist Opportunities in the BIPM Chemistry Department (Q4 2018 and 2019)

Number	Programme Area	Name and Description of Secondment Project	Duration of Secondment	Period over which Secondment can be undertaken	Required experience of Visiting Scientist to undertake Secondment
1	Gas Standards and Comparisons	**Name : Preparation and analysis of isotope ratio CO_2 reference gas mixtures** To contribute to the development and validation of BIPM's Stable isotope reference mixture generation facility for blending CO_2 isotope ratio gas mixtures with $\delta^{13}C$ over the range -1‰ to -40 ‰ (vs VPDB-CO_2). The visiting scientist will optimise methods for $\delta^{18}O$ values modification of samples, isotopic equilibration and value assignment with the Delta Ray optical system. The accuracy of the method will be compared with measurements performed by Isotope-ratio mass spectrometry (IRMS) as part of the collaboration with the International Atomic Energy Agency (IAEA) in preparation for a CCQM GAWG comparison.	6 months preferred	September 2018 to December 2019	Previous experience in one or more of the following: • gas standard preparation • operation of FTIR or IRIS instruments • isotope ratio measurements
2	Gas Standards and Comparisons	**Name : Optimisation of BIPM's manometric facility for the BIPM.QM-K2 on-going comparison of carbon dioxide in air standards** To further characterise adsorption and trapping efficiencies within BIPM's manometric reference method for the value assignment of CO_2 in air standards in preparation for BIPM.QM-K2, including calibration and measurement methods for trace water To value assign two sets of nine CO_2 in air standards over the range (380-800) µmol/mol using the manometric system. Comparison of internal consistency of the sets of standards using an Aerodyne TDLAS system, corrected for isotope ratios, as well as characterization of the relationship between the two ensembles of standards.	6 months preferred	September 2018 to December 2019	PART1: System development Previous experience in one or more of the following: • RGA operation and calibration • Cryogenic trapping of gases • Trace water measurement PART2: System validation Experience in: • CO_2 gas standard preparation and analysis • Operation of TDLAS/CRDS systems for CO_2 and N_2O mole fraction measurement

3	Organic Analysis – Small Molecules	**qNMR – small molecules** Contribute to the ongoing work programme for the validation of qNMR methods for purity assignment. Researchers will use the sample preparation facilities and the JEOL ECS-400 MHz spectrometer at the BIPM to investigate optimization of qNMR experimental parameters, to expand the set of primary standards for use in qNMR	Minimum 3 months, preferably 6 months	September 2018 – December 2019	• Expertise in the theory and practice of NMR spectroscopy; • Background in analytical organic chemistry; • Experience in performing qNMR measurements Practical knowledge of the operation of NMR spectrometers and the optimisation of operating parameters is essential. Previous experience with JEOL NMR systems and the Mnova NMR software advantageous
3a	Organic Analysis – Large Molecules	**qNMR applications for peptides and small proteins** Investigate applications of qNMR for the purity assignment of peptides and small proteins using external calibration qNMR techniques.	Minimum 3 months, preferably 6 months	September 2018 – December 2019	• Expertise in the theory and practice of NMR including qualitative analysis of peptides; • Experience in performing qNMR measurements; Practical knowledge of the operation of NMR spectrometers and the optimisation of operating parameters is essential. Previous experience with JEOL NMR systems and the Mnova NMR software advantageous
4	Organic Analysis – Small Molecules	**Mycotoxin Calibration Solution Comparison** To support the BIPM capacity building and knowledge transfer (CBKT) programmme designed to allow NMIs to work together to strengthen mycotoxin metrology infrastructure. A visiting scientist(s) are sought to contribute to the set-up and coordination and measurements for a comparison of mycotoxin calibration solutions to enable NMIs to assess new/already established capabilities.	Minimum 6 months, preferably 12 months	2019/2020	Previous experience in one or more of the following • LC-MS(/MS) of small molecules • UV spectrophotometry of small molecules in solution • Performing homogeneity and stability testing • Experience in mycotoxin analysis would be an advantage
5	Organic Analysis – Large Molecules	**Mass Spectrometric and Ion mobility characterization of peptide calibrators** Visiting scientists are sought to further develop LC-IM/MS(/MS) (Qtrap6500+) methods to identify and quantify related structure impurities in peptides that possess multiple cross-links and occur in several isobaric higher order structures. This will support future pure primary peptide calibrator comparisons (CCQM-K115 series) focussing on multi-cross-linked peptides.	Minimum 6 months, preferably 12 months	2019	• Experience with liquid chromatography – mass spectrometry Previous experience in one or more of the following • LC-MS(/MS) of peptides/proteins • Experience in use of ion mobility mass spectrometry would be an advantage

6	Organic Analysis – Large Molecules	**High resolution mass spectrometry of peptides/proteins** Visiting scientists are sought to develop LC-hrMS(/MS) (Orbitrap) methods to characterize suitable materials for future pure primary peptide calibrator comparisons which will focus on future rounds of CCQM-K115.	Minimum 6 months, preferably 12 months	2019	• Experience with liquid chromatography – mass spectrometry Previous experience in one or more of the following • LC-MS(/MS) of peptides/proteins • Peptide mapping • Experience in use of high resolution mass spectrometry (Orbitrap) would be an advantage
7	Organic Analysis – Large Molecules	**Peptide impurity corrected amino acid analysis** Visiting scientists are sought to further develop the PICAA approach for peptide quantification based on quantifying constituent amino acids (LC-IDMS) following hydrolysis of the material (microwave-assisted vapour-phase hydrolysis) and correction for amino acids originating from impurities, to support future pure primary peptide calibrator comparisons (CCQM-K115 series)	Minimum 3 months, preferably 6 months	2019	• Experience with liquid chromatography – mass spectrometry Previous experience in one or more of the following • LC-IDMS(/MS) of peptides/proteins • Hydrolysis of peptides/proteins

The BIPM is able to provide a housing and living allowance to visiting scientists for the period of the secondment. The home institute of the visiting scientist shall continue to pay salary and insurance for the scientist for the period of the secondment.

Scientists wishing to undertake a secondment in the BIPM should contact the Department Director, Dr R.I. Wielgosz, for further information (rwielgosz@bipm.org)