S2-5: An action quantum on a scale – dissemination of the quantum based kilogram

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Abstract: The Meter Convention exists more than hundred years. The units hosted by the Metre convention base on ideas born within the French Revolution. Thus, the meter and the kilogram were defined by natural constants of that time, the circumference of earth and the mass of water at a specific temperature. Even at that time metrologists try to find stable realisations of the definitions. One of the resulting artefacts is still defining the Kilogram. Just now we are facing the change to a system of international units defined via natural quantum based constants. Even the Kilogram will be defined by a natural constant, the Planck-Constant.

The “new Kilogram” will by its link to the Planck-Constant offer theoretically unlimited ways for its realisation. Just now only a few seem to be achievable. The experiments required for a new definition – the Kibble-Balance and the Avogadro-Sphere – are expected to be the two most prominent realisations. But, are these tremendously expensive experiments that are probably difficult in operation as well suitable in the sense of disseminating the Kilogram?

The presentation would like to develop the idea of silicon spheres of different qualities for the dissemination of the quantum based kilogram to the macroscopic world. Beside metrological aims even the availability of realisations is an important aspect within such a dissemination chain. The developed tools and procedures for using the spheres as mass standards and the respective investigations will be presented. Aspects like the connection to the “old” system as an important aspect for practise or the current state of the activities to proof the expected long term characteristics of silicon spheres in use will be highlighted as well.