

Plenary Talk (SAMOP) PV XIX Thu 9:15 HSZ 02
Precision spectroscopy using quantum logic — ●PIET O.
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During the past years, tremendous progress has been made in optical precision spectroscopy, culminating in a recent frequency ratio measurement of two optical clocks with an accuracy of 18 digits. This has become possible by using quantum logic techniques developed for quantum information processing with trapped ions. A logic ion is simultaneously trapped with the spectroscopy ion to provide sympa-

thetic cooling, state initialization and detection. I will present two experiments, in which previously inaccessible atomic ions are investigated using this technique. In the first experiment, we plan to use quantum logic spectroscopy to build a portable optical clock based on a single aluminium ion that is controlled via a calcium logic ion. In the second experiment, we combine quantum logic spectroscopy with direct frequency comb spectroscopy to perform precision spectroscopy of atomic and molecular ions with a complex level structure. Such measurements provide a means to test fundamental theories beyond the standard model, e.g. by probing possible temporal changes in fundamental constants.