Laser ablation split-stream between high-sensitivity SC- and MC- ICP-MS instruments

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Laser ablation split-stream ('LASS') is a technique that allows for the simultaneous analyses of different geochemical systems in mineral samples using two or more mass spectrometers [1]. This allows geochemical information collected by the different instruments to be determined from exactly the same ablation volume, avoiding the assumption that serial analyses of neighbouring sites are not affected by heterogeneity (chemical zonation). Further, sample throughput can also be increased.

An important application is the determination of the complementary isotopic systems of Lu-Hf and U-Pb (age) which can be determined from the mineral zircon using MC-ICP-MS and SC-SF-ICP-MS respectively, e.g. [2]. Fisher *et al* 2014 [3] illustrate the advantages of LASS with respect to interpretation of Hf isotopes, where sequential analysis can lead to incorrect U-Pb age assignment.

In this research, the ablation output from a Photon Machines Analyte.G2 193 nm laser ablation system (Bozeman, MT, USA) was split between a Thermo Scientific NEPTUNE *Plus* MC-ICP-MS and an ELEMENT XR SC-SF-ICP-MS (Bremen, Germany). A simple, reproducible and reliable two-way split was made to the laser cell output. Both mass spectrometers were configured for enhanced sensitivity [4], enabling smaller spot sizes (25 - 35 μm) to be used for ablation (with 2σ precisions at epsilon unit level for Hf, and ca. 2% for U-Pb). This reduction of spot size allows analysis of mineral grains that would otherwise be excluded due to size (increasing population sample size and representativity).

[1] Kylander-Clark *et al* (2013) *Chemical Geology*, **345**, 99-112. [2] Tollstrup *et al* (2012) *Geochemistry, Geophysics, Geosystems*, **13** (3), 1525-2027. [3] Fisher *et al* (2014), *Geochemistry, Geophysics, Geosystems*, article in press. [4] Lloyd *et al* (2012), *Mineralogical. Magazine*, **76**, 2029.