Selective resonance laser ionization has proven to be a very successful method for the production of radioactive ion beams (RIB) and for the study of nuclear properties of radioisotopes in a model-independent way. As the part of the upgrade of the IGISOL facility to a new IGISOL-IV laboratory at the Accelerator Laboratory of the University of Jyväskylä (JYFL), the Fast Universal Resonant laser IOOn Source facility, FURIOS, has undergone several improvements including development of laser systems, laser ion sources and related experimental arrangements.

Important parameters involved in resonant laser ionization spectroscopy include the output laser power, wavelength range and linewidth of the laser system. The laser power from second and fourth harmonic generation of the Ti:sapphire-based laser system, used at FURIOS, has been greatly improved by intra-cavity frequency doubling. Efforts currently underway for the reduction of the linewidth of the laser system include a double-etalon based method and injection-locked Ti:sapphire lasers [1].

The move of the laser facility has allowed the front end of IGISOL to be modified to allow direct and easy access for the transport of laser light both into the gas cell and via an electrostatic deflector chamber for ionization in the gas jet. The improved access of the laser into the jet coupled with a novel ion guide nozzle design providing highly collimated gas jets, addresses problems affecting the efficiency of the laser ion source trap (LIST) method. Performing resonance laser ionization in the jet is attractive due to reduced Doppler and pressure broadening [2].

The ion sources have also been developed to improve the ionization efficiency and the condition of the ionization environment. A dual-chamber gas cell [3], designed to prevent plasma created by the primary beam, affecting the ionizing efficiency, has been introduced and tested at the IGISOL front end. In this presentation we discuss many of these developments.