

1. Study of short-lived nuclei far from the beta-stability line.

Identification of new nuclides.

Detailed spectroscopic investigations of nuclides in exotic regions by using detectors of different type allowed to identify new nuclides at the IRIS facility for the first time. The list of the identified new isotopes is presented in the review "The IRIS facility and nuclear-spectroscopic investigations of nuclides far from the beta-stability region." in PNPI report of the High Energy Physics Division [Main Scientific Activities 1971-1996](#)).

Atomic mass determination by means of positron spectra endpoint energies.

An unknown atomic mass value can be determined if the mass of the daughter nuclide and the mass difference between parent and daughter nuclides are known. The mass differences between parent and daughter nuclides can be obtained by means of beta-spectrum endpoint energy measurement making use of a high resolution beta-spectrometer. Positron emitters in the region of rare-earth elements were studied at the IRIS facility. For the first time the determination of positron spectrum endpoint energies for a large range of isotopes was performed with a good precision.

Identification of the drip line of the proton unstable nuclides.

The nuclide mass determination, which was done using the measured endpoint energies of positron spectra, allowed to construct the mass-surface for nuclides located extremely far from the beta-stability line. The precise measurements of alpha-spectra in the rare earth region at the IRIS facility have led to observation of some unknown alpha-emitters. It allowed to join the fragments of long alpha-decay chains and to obtain the masses of all nuclides in these chains using the known mass values of nuclides located at the bottom of every chain. The obtained mass values were used to identify a fragment of the drip line for the proton unstable nuclei.

(For more detailed review see article " [The IRIS facility and nuclear-spectroscopic investigations of nuclides far from the beta-stability region](#)" in PNPI report of the High Energy Physics Division " [Main Scientific Activities 1971-1996](#)").