

# Ti: Sa laser systems' development for REGLIS<sup>3</sup>

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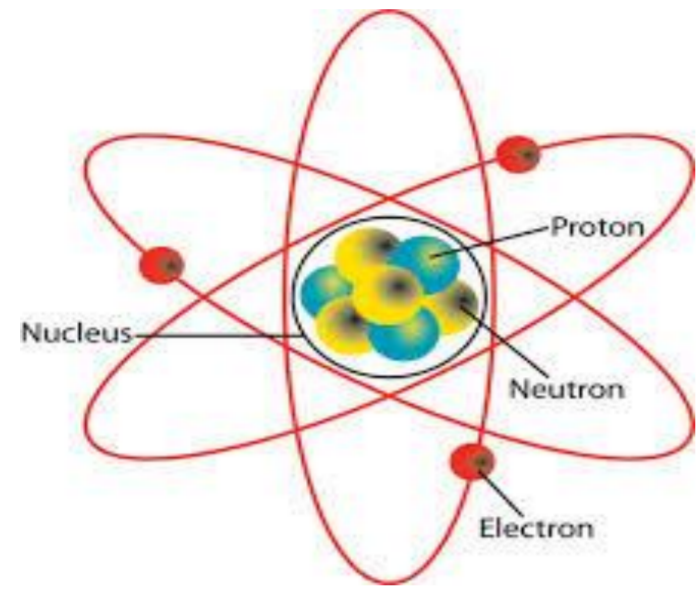
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**Abstract:** The development of the laser system means instead of using manually the optical mounts, there will be automatically usage of these optical mounts by using programming and motorization. This development will be for the new device being built at GANIL in Caen which is the REGLIS (Rare Element in Gas Laser Ion Source and Spectroscopy) device. It will be used to produce RIBs and study the properties of nuclei at low energy.

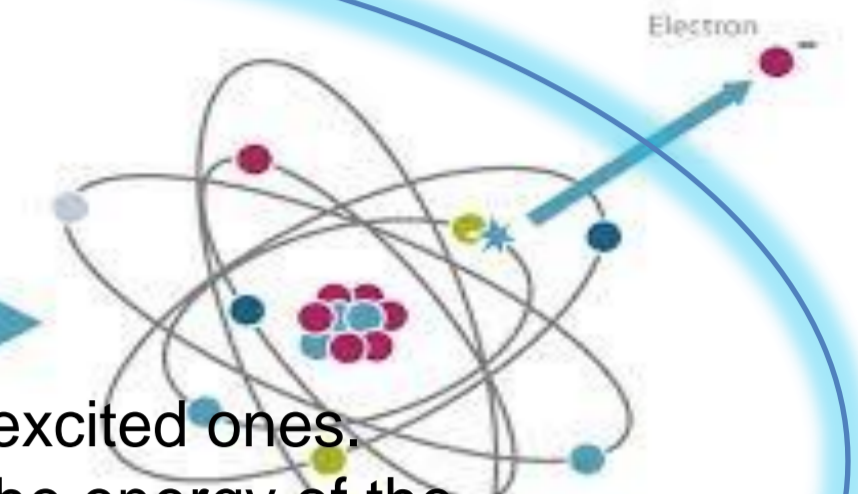
## An atom ?

It is the basic constituent unit of matter. It is made of nucleus (which contains protons and neutrons) and electrons which they are placed on energy levels rotating around the nucleus.



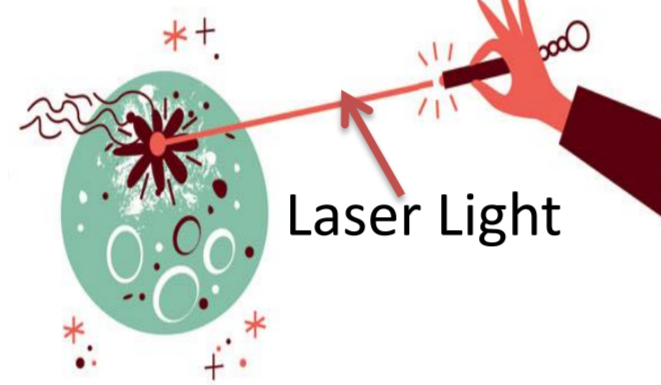
## An Ion ?

When the atom receives energy as light for example, the electrons moves from one energy level into higher excited ones. If the sent energy is greater than the energy of the atom, an electron can be ejected from the atom and hence it will be an ion. This process is called Ionization.



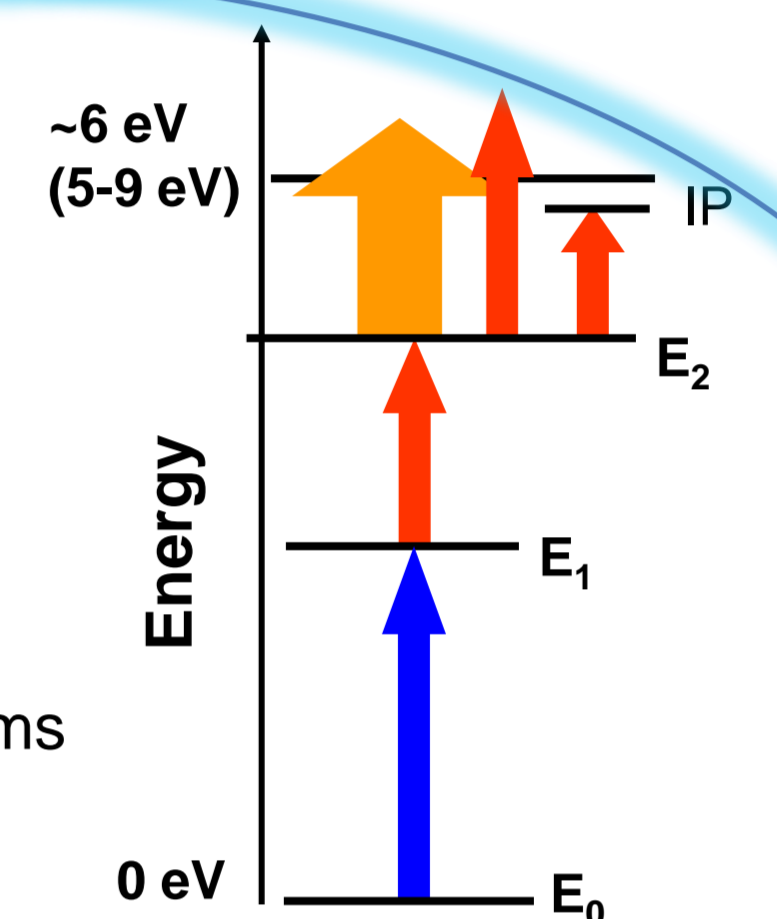
## Lasers and Ti: Sa Lasers ?

Laser refers to light amplification by stimulated emission of radiation. Titanium: sapphire (Ti: Sa) laser Uses the band structure of Ti+3 ions in a sapphire host crystal.



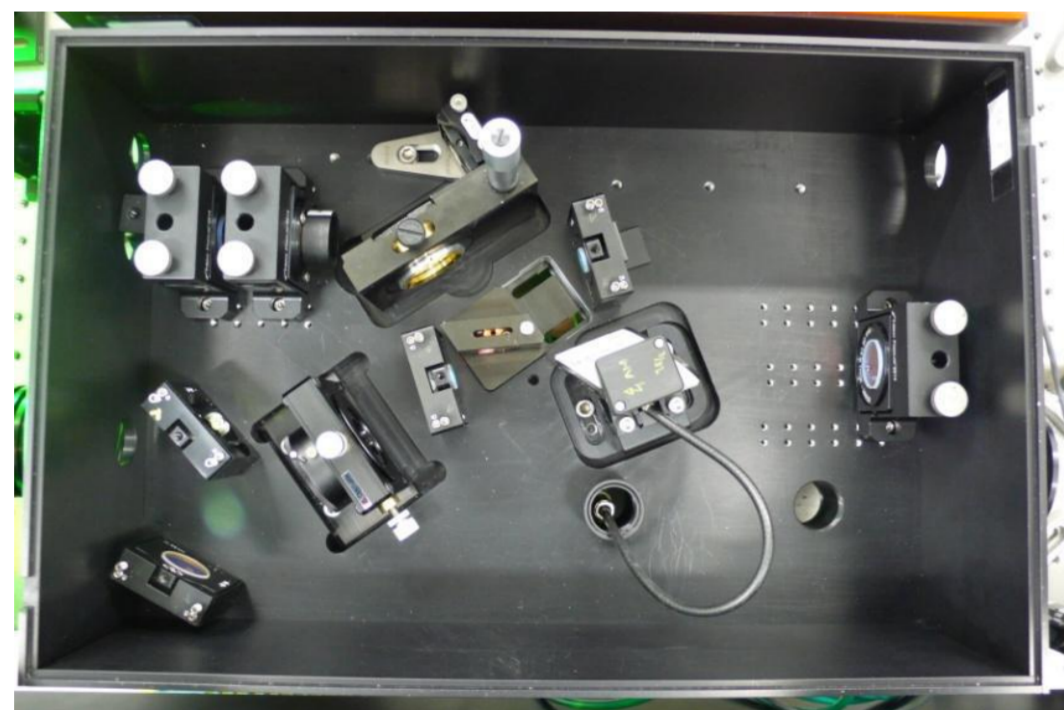
## RILIS ?

It is the Resonant Ionisation Laser Ion Source technique, which is, the Ionisation process where the energy being sent is the Laser Light. Three laser beams of a given energy are needed to ionize a specific element.



## Ti: Sa Laser system at GANIL

At GANIL, there are three Ti: Sa cavities (Laser system), each cavity is made of Ti: Sa crystal, group of mirrors and other optical components. Everything is done manually by changing the energy or the wavelength of the light ( $E=h \cdot C/\lambda$ ).

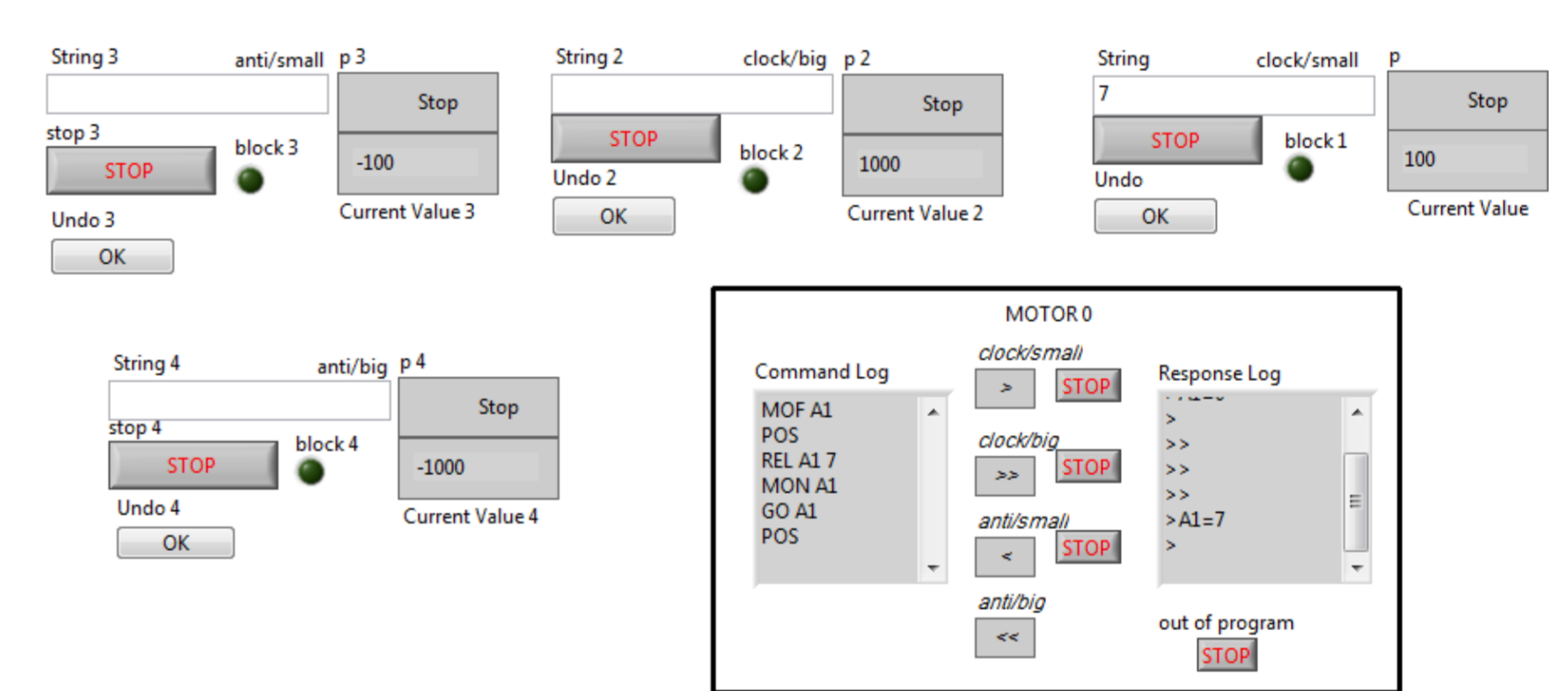
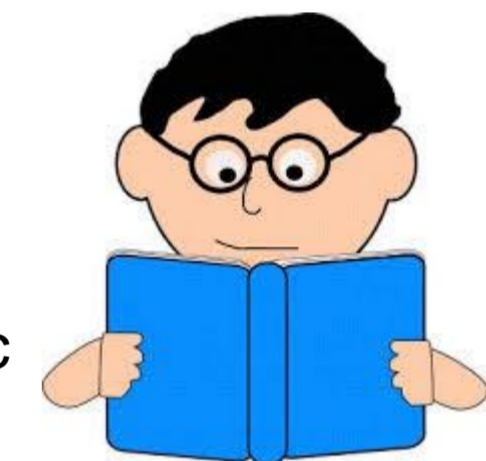


Optical mount



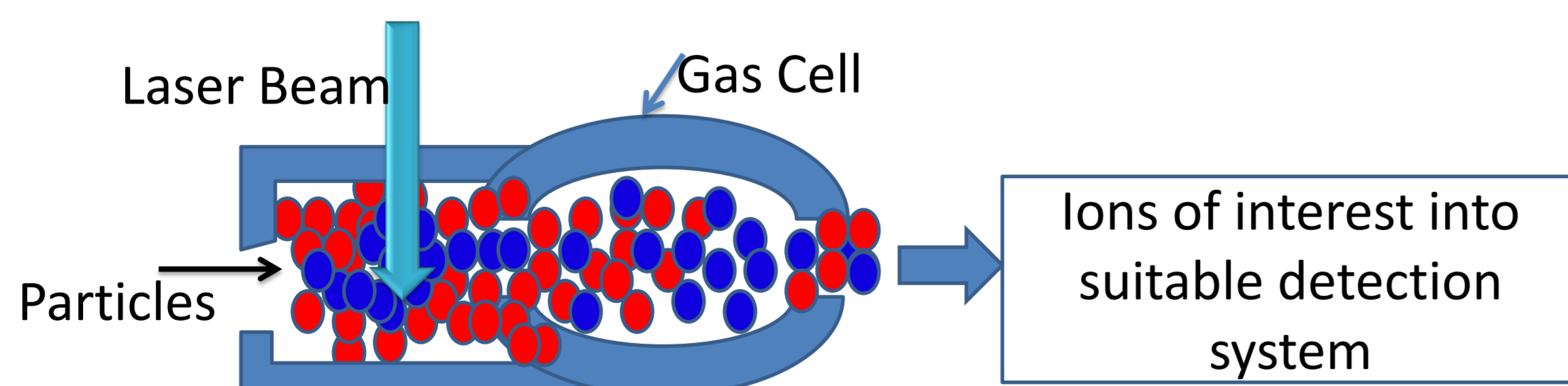
## Development of Ti: Sa Laser system at GANIL

For having more precision and more accuracy, the things will be done automatically. By automatic means using motorization and programming.



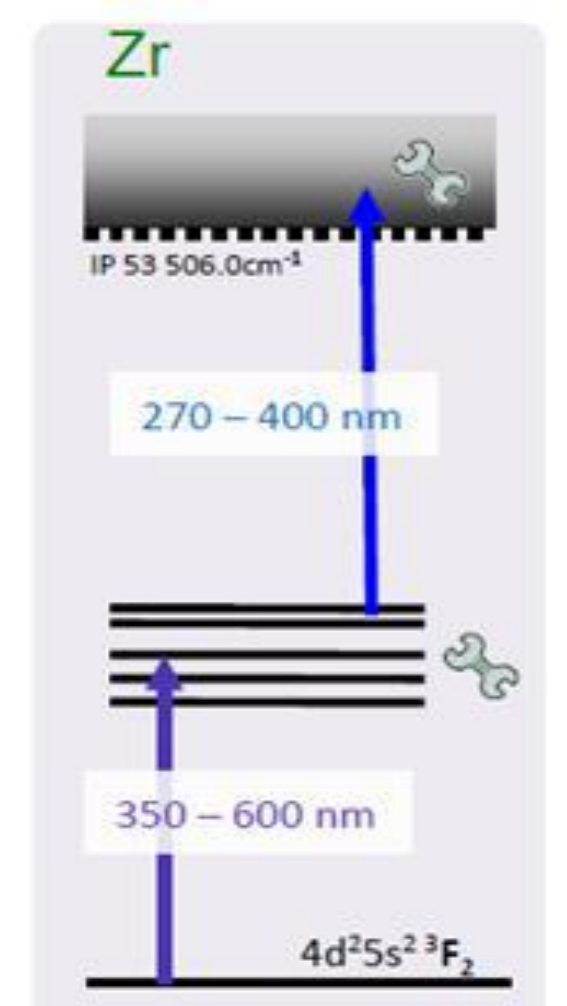
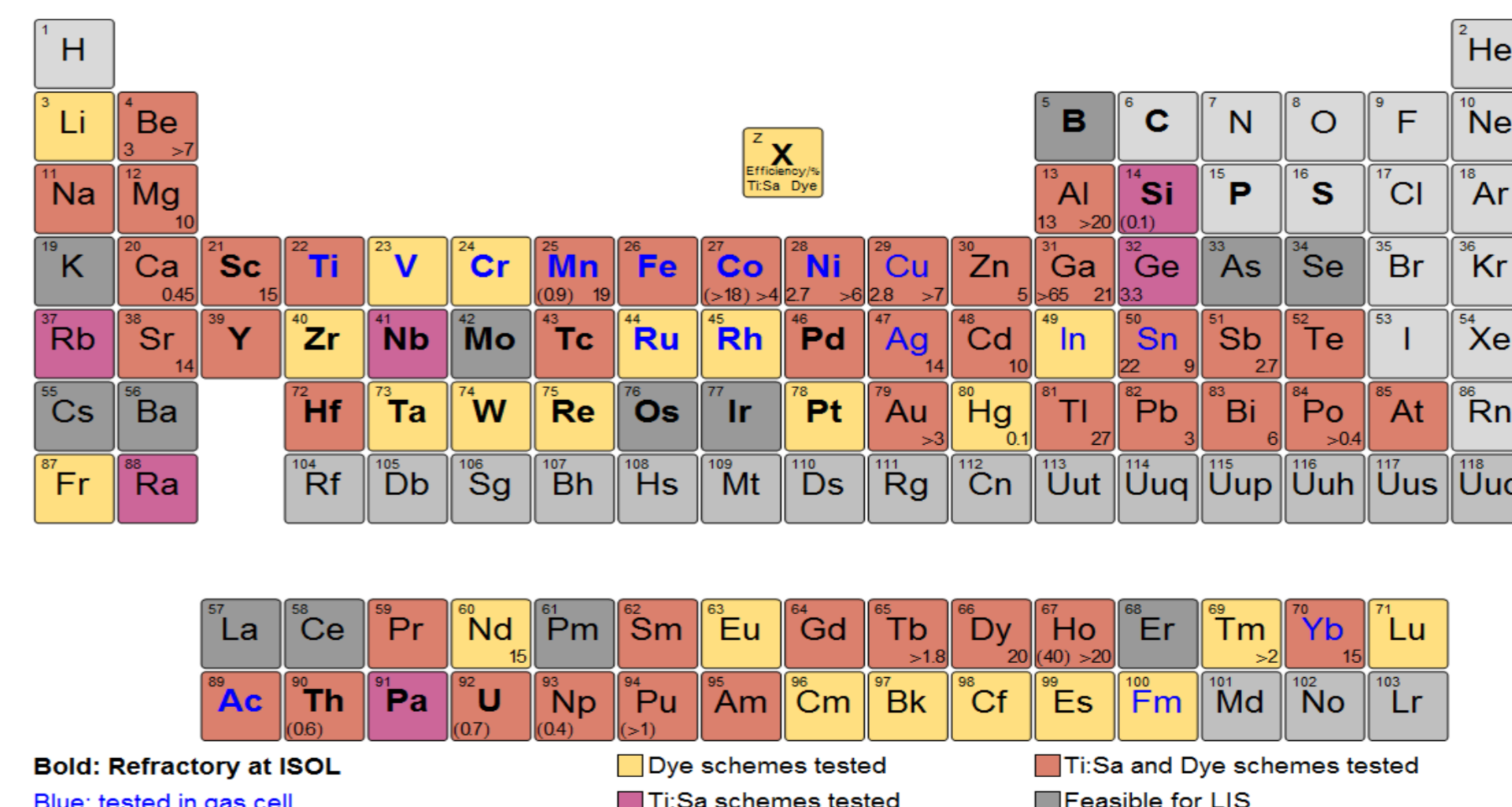
## Why is the development?

The development will be for the REGLIS device which will be installed at GANIL. REGLIS is made from a gas cell where the radioactive ions are stopped and neutralized. Then the lasers beam enter to assure ionization by RILIS process. Then the ion of interest will go into a suitable magnetic optics and then into a detection system.



## The elements being tested with a gas cell and the search of excitation schemes?

Tin, Zirconium, Yttrium, Nobelium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Ruthenium, Rhodium, Silver..



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