A versatile detector for surface Mössbauer Spectroscopy

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Mössbauer spectroscopy is based on the the resonant, recoil-free absorption of nuclear gamma radiation. The incorporation of the emitting and absorbing nuclei within a solid matrix enables resonant absorption and emission of gamma rays forms the basis of the method

Following resonant absorption of a gamma ray, the nucleus may de-excite by emission of a gamma ray or by the process of internal conversion where an inner (K or L) shell electron is emitted. The conversion electron signal is quite high for the ^{57}Fe, ^{119}Sn and ^{151}Eu isotopes. In scattering geometry surfaces, coatings and thin films can be studied on substrates and to various depths

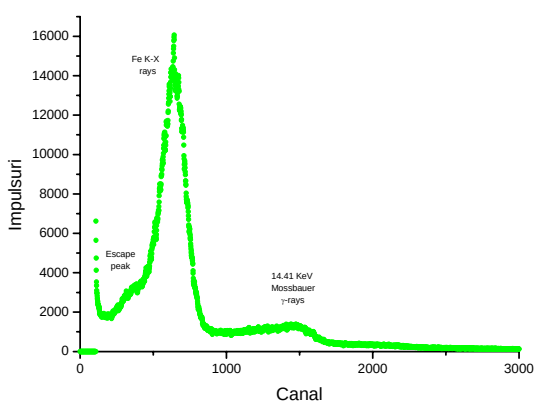
Were constructed a versatile flow-gas proportional counter for conversion Mössbauer Spectroscopy, suitable for surface studies with all mentioned isotopes.

Detector lateral view

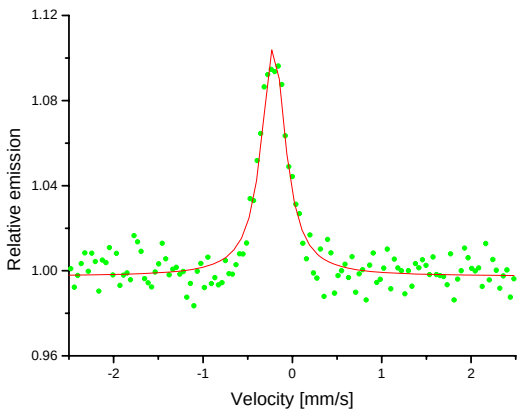
Detector top view

Main improvements:

- detection volume can be changed in large limits
- configuration of the anode wire can be easily changed
- useful for low energy X-ray and low energy detection
- the improved design of the detector is found to be superior design than those previously reported for such devices.



Gamma spectrum of iron-57 source



Moessbauer spectrum of stainless steel obtained by superficial X-rays

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