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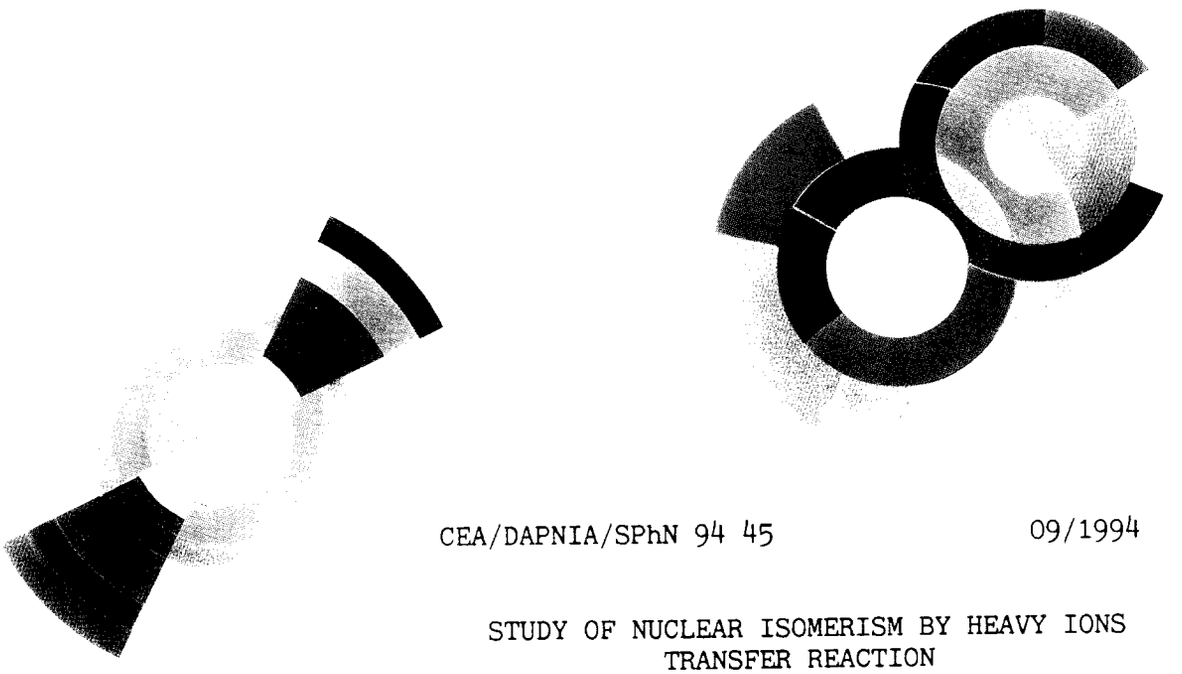

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STUDY OF NUCLEAR ISOMERISM BY HEAVY IONS TRANSFER REACTION

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DAPNIA

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We have undertaken in 1990, at SACLAY, an experimental program aiming to observe and study nuclear isomerism taking advantage of the high selectivity of the transfer reactions associated with high resolution gamma detection.
The experimental procedure consist in bombarding a target with a heavy ion beam delivered by the Saclay Superconducting Postaccelerated Tandem, detect and identify the ejectile in a QDDD spectrometer and observe the gamma decays in a Germanium array composed of six triple-telescopes BGO Compton suppressed surrounding the target.

The measure of the particle-gamma delay allows a very precise determination of the isomers half lives in a range of 10 to 500 ns.

This technique was used to characterize new isomeric states.
For instance, in ^{65}Ni formed by ^{64}Ni(^{18}O,^{17}O) at 72 MeV, a 1013 keV gamma ray was observed. The high energy resolution of the spectrometer allowed to attribute unambiguously this gamma ray to the $9/2^+ \rightarrow 5/2^-$ transition. The $9/2^+$ state was already known but its decay was seen here for the first time.
This state is an 26.5 +/- 0.5 ns half live isomer. An interesting feature about this state is that recent HFB calculations by M. Girod et al. or BCS calculations by P. Bonche show that this state is quite oblate as the $5/2^-$ ground state is more or less spherical. How does this property affect the life time of this state?

Search for so-called shape isomer was also addressed. Both, light nuclei (^{66}Ni) and heavier systems like ^{194}Hg or ^{210}Po were studied.

In Ni isotopes, no firm experimental evidence for shape isomerism was observed even if a good candidate was found in ^{68}Ni.
In our study of the ^{64}Ni(^{18}O,^{16}O)^{66}Ni reaction a delayed 1020 keV gamma ray was observed which could correspond to the transition from the 0^+ predicted shape isomer to the first excited 2^+ state. The lack of statistics does not allow any firm conclusion about the existence of this isomer in this Ni isotope. Additional data taking is planned before summer.

Latest results will be presented.