ADAM

THE PHYSICIST, THE FRIEND, THE MENTOR

Marta Kicińska-Habior

Symposium on the occasion of Angela Bracco and Adam Maj
60th Birthday

14 September, 2015 Kraków
1985-1987, NPL Seattle
Kurt Snover’ group

inclusive GDR experiments

$^{39}$K, $^{40}$K, $^{42}$Ca, $^{45}$Sc, $^{63}$Cu, $^{90}$Zr, $^{92}$Mo, $^{100}$Mo,

γ-ray spectra and angular distributions

temperature and spin dependence of the GDR width, nuclear shape evolution,
1989-1990, NBI Copenhagen

Copenhagen-Milano-Kraków collaboration (since 1989)
Jens Gaardhoje, Angela Bracco, Adam Maj

HECTOR (High Energy gamma-ray detector) array:
Copenhagen-Milano-Kraków collaboration
Jens Gaardhoje, Angela Bracco, Adam Maj

HECTOR + HELENA exclusive experiments

γ-ray spectra, angular distributions, spin distributions

$^{162}$Yb, $^{158}$, $^{166}$Er,

temperature dependence of the GDR width, evolution of nuclear shape, limits of nuclear stability, ...

excitation energy differential technique

Milano-Copenhagen-Kraków collaboration
Angela Bracco, Jens Gaardhoje, Adam Maj

HECTOR + HELENA + other detectors
exclusive experiments at Riso, Legnaro, Strasbourg

$^{108-112}$Sn, $^{143,147}$Eu, $^{170}$W,
$^{194}$Hg, $^{272}$Hs,...

...nuclear shapes and thermal fluctuations,
origin of the GDR width, GDR in superheavy nuclei, GDR on superdeformed states,
entrance channel effects, ...

... studies of the exotic nuclear shapes
NPL Seattle, 1989-1990
\(^{18}\text{O} + ^{27}\text{Al} \rightarrow ^{45}\text{Sc}\)
inclusive experiment
\(E_{\text{lab}} = 45, 73, 89, 110 \text{ MeV}\)
\(l_{\text{max}} = 20, 28, 33, 36 \hbar\)

First signatures of Jacobi shape transition

\[ I = 27 \]
\[ \eta \]

\[ \beta = 0.4, \gamma = -30^\circ \]

predictions

$^{18}\text{O} + ^{28}\text{Si} \rightarrow ^{46}\text{Ti}$ exclusive experiment,

$E_{\text{lab}} = 98\text{ MeV}$

$I_{\text{max}} \approx 32\hbar$

$E^* = 81\text{ MeV}$
First signatures of Jacobi shape transition

Seattle experiment


NBI experiment

IReS Laboratory Strasbourg, ~2000

$^{18}\text{O} + ^{28}\text{Si} \rightarrow ^{46}\text{Ti}$

exclusive experiment,

- HECTOR - GDR
- EUROBALL - discrete transitions
- multiplicity filter (spin)
- EUCLIDES - light charged particles
HECTOR+EUROBALL experiment

105 MeV $^{18}$O + $^{28}$Si $\Rightarrow ^{46}$Ti*

$I_{\text{max}} \approx 35 \hbar$

$E^* = 85$ MeV


Multiplicty gated

High spin

Low spin

Low energy component increasing with spin

gated with $\gamma$ transitions in $^{42}$Ca residuum
Jacobi shape transition - theoretical predictions

potential energy calculated with LSD (Lublin-Strasbourg Drop) model:

LSD calculations

thermal shape fluctuations + Coriolis splitting

\[ P(\beta, \gamma) \propto \exp(-F(b, g)/T) \]

\[
f_{GDR}^{av}(T, I) = \int \int f_{GDR}(\beta, \gamma, \omega)e^{-F(T,I;\beta,\gamma)/T(I;\beta,\gamma)} \beta^4 |\sin(3\gamma)| d\beta d\gamma
\]

Jacobi shape transition and indicated for the first time Coriolis effect

Seattle, NPL 1993
GDR and bremsstrahlung experiment

$^{12}\text{C} + ^{24,26}\text{Mg}$ at 6-11 MeV/u

GDR studies at HIL, Warszawa

- JANOSIK set-up
  - 25 cm x 29 cm NaI(Tl) detector for high-energy γ-ray measurement
    with shield (plastic + $^6\text{LiH}$ + lead) to reduce cosmic background
  - Si-Ball - p and α detection


- Isospin mixing investigations


Nuclear Physics School - Zakopane 1992

Adam

Marta
At Marta’s summer place, Busko 2007

At Adam’s place, Kraków 2008
Adam’s PhD students
ADAM - the Mountaineer

Sidzina - beautiful village, Beskid Mountains, where Adam was born
Dear Angela and ADAM

CONGRATULATIONS and my BEST WISHES for the future successful years