GANIL
Grand Accélérateur National d'Ions Lourds

Ciril
Centre Interdisciplinaire de Recherche Ions Lasers

Ion beams at GANIL

CIRIL operates beam lines and specific equipment (spectrometers, irradiation devices etc) in the whole ranges of available ion species and beam energies :

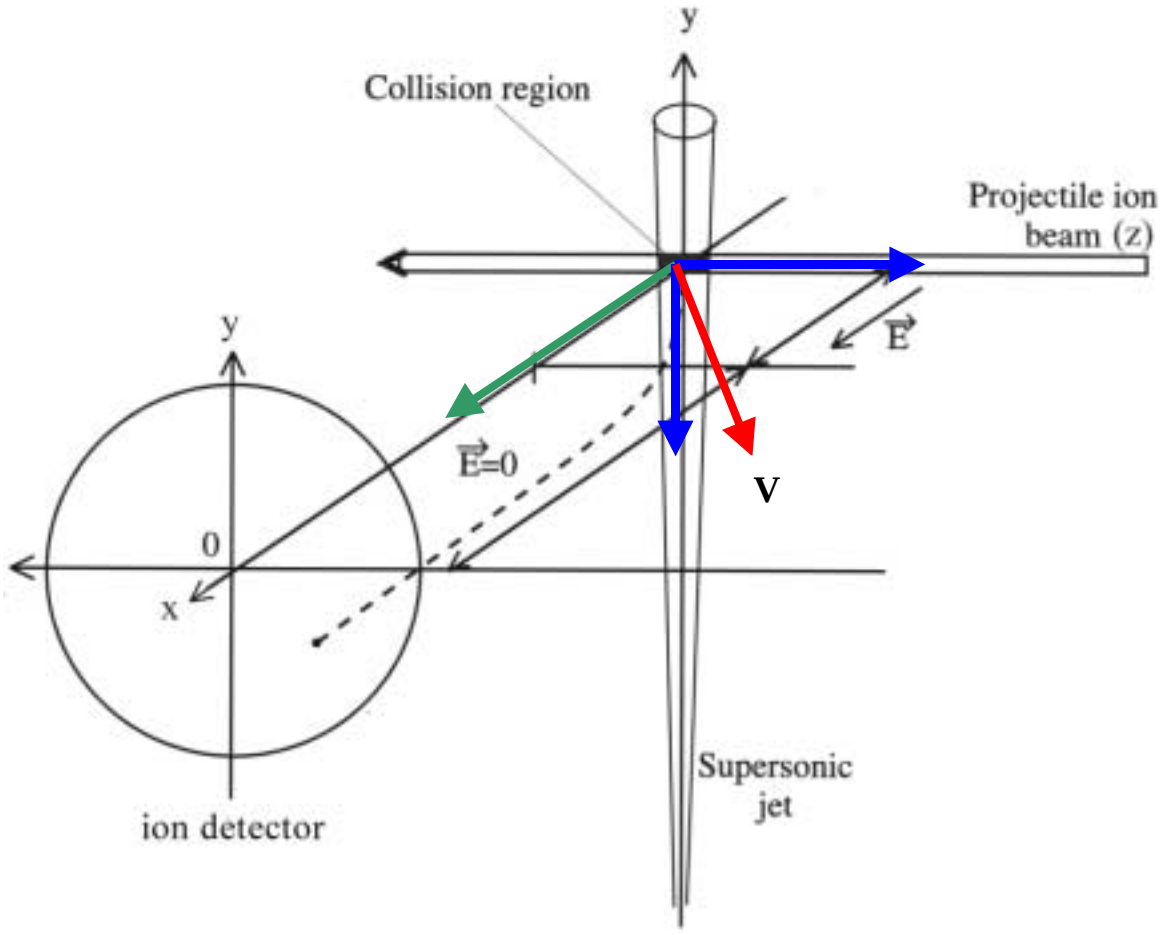
• High energy	Carbon to Uranium	95 to 25 MeV/A
• Medium energy	Carbon to Uranium	13.6 to 4 MeV/A
• Injector cyclotrons	Carbon to Uranium	1 to 0.4 MeV/A
• ECR ion sources	Helium to Uranium	0.5 to 25 q.keV

At ECR ion sources, a line specifically designed for the production of very low energy ion beams (down to a few q.eV) will be implemented in the forthcoming months.

Atomic and Molecular Physics group at CIRIL

L. Adoui	Scientist	**P. Boduch**	Scientist
A. Cassimi	Scientist	**J.Y. Chesnel**	Scientist
G. Cremer	Scientist	**F. Frémont**	Scientist
D. Hennecart	Scientist	**B. Huber**	Scientist
X. Husson	Scientist	**H. Rothard**	Scientist
B. Manil	Postdoc	**M. Tarisien**	Postdoc
G. Allio	Phd Stud.	**G. Laurent**	Phd Stud.
S. Legendre	Phd Stud.	**G.Ntamak**	Phd Stud.
P. Sobocinski	Phd Stud.		

PRINCIPLE OF RIMS



$$TOF = k\,(m/q)^{1/2} - m\,Vx/qE$$

$$T_0 = k\,(m/q)^{1/2}$$

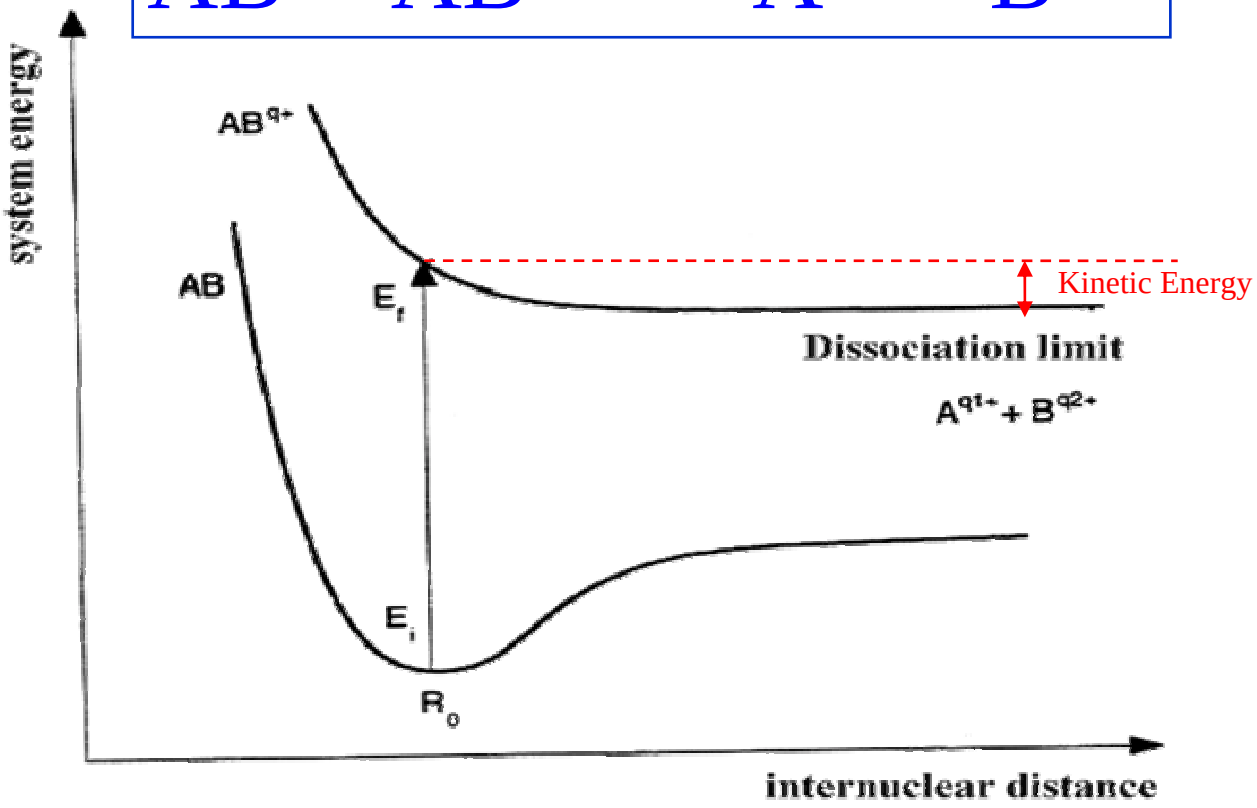
$$Vx = qE\,(TOF - T_0)/m$$

$$Vy = (y-y_0)/\,TOF$$

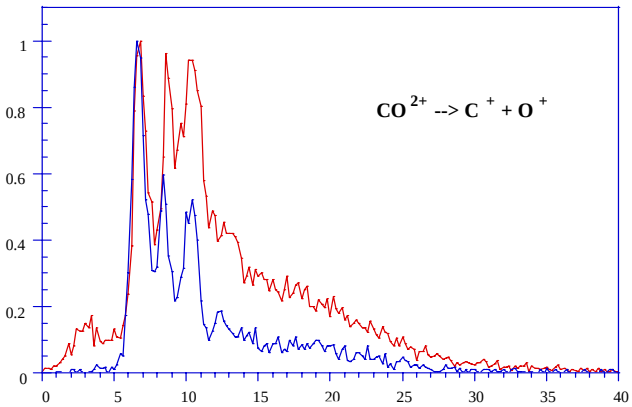
$$Vz = (z-z_0)/\,TOF$$

APPLICATION OF RIMS TO THE STUDY OF MOLECULAR FRAGMENTATION

$$AB \Rightarrow AB^{(q+)*} \Rightarrow A^{q_1+} + B^{q_2+}$$



Ionization or Capture



— 11.4 MeV/A O^{7+}

— 4 keV/A O^{7+}

$t_{int.} \cong 10^{-17}s$, $t_{diss.} \cong 10^{-14}s$, $t_{rot.} \cong 10^{-12}s$

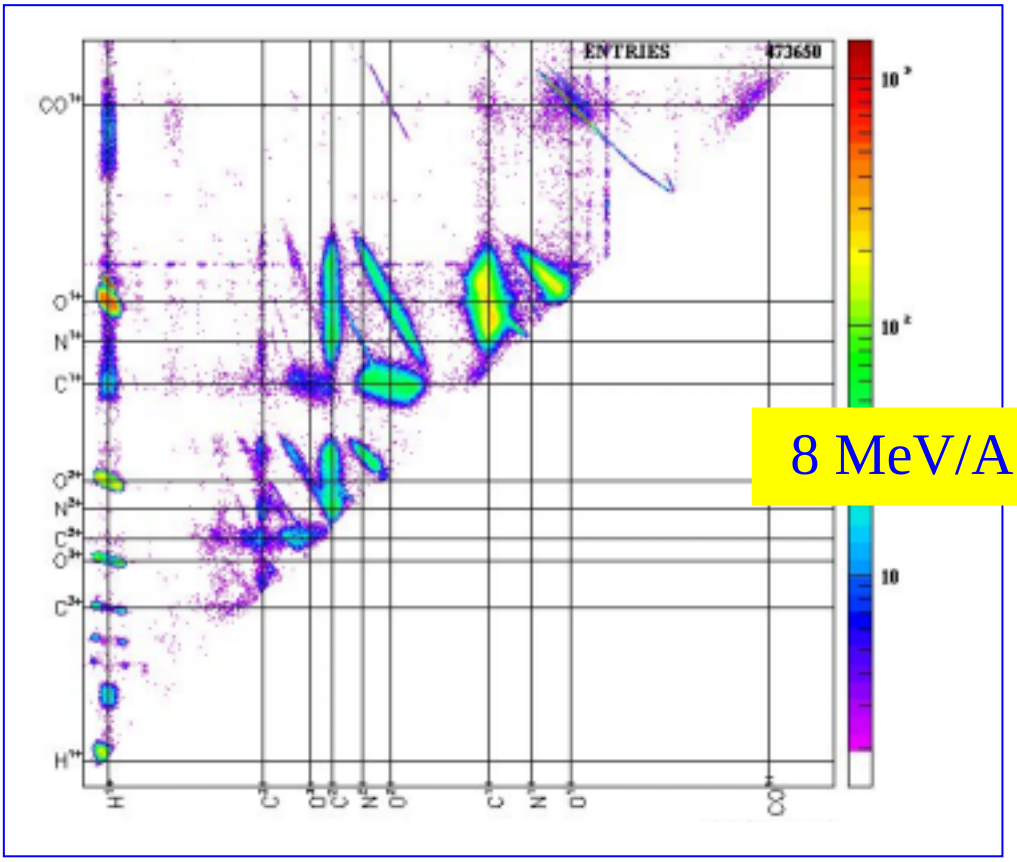
Orientation of the Molecule

FRAGMENT CORRELATION MAPS

TOF of 2nd fragment

8 MeV/A Ni^{24+} + CO

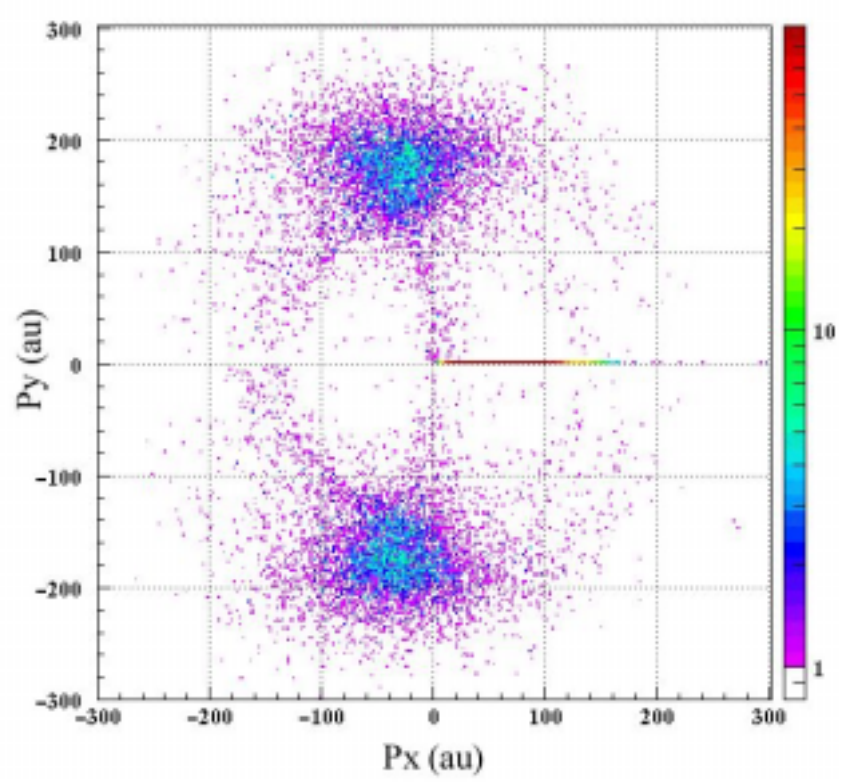
TOF of 2nd fragment

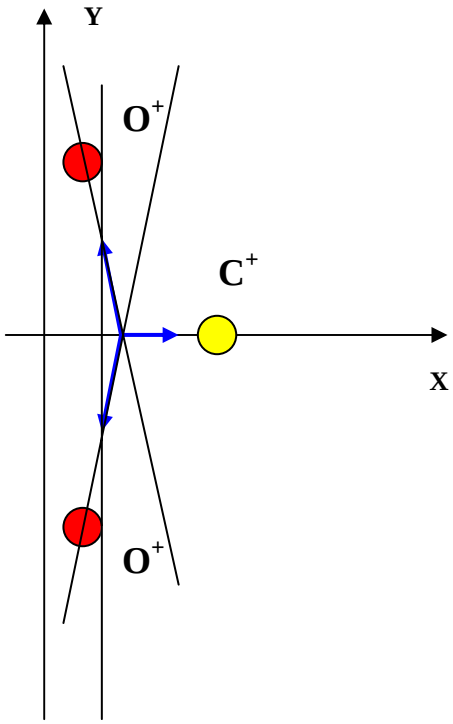


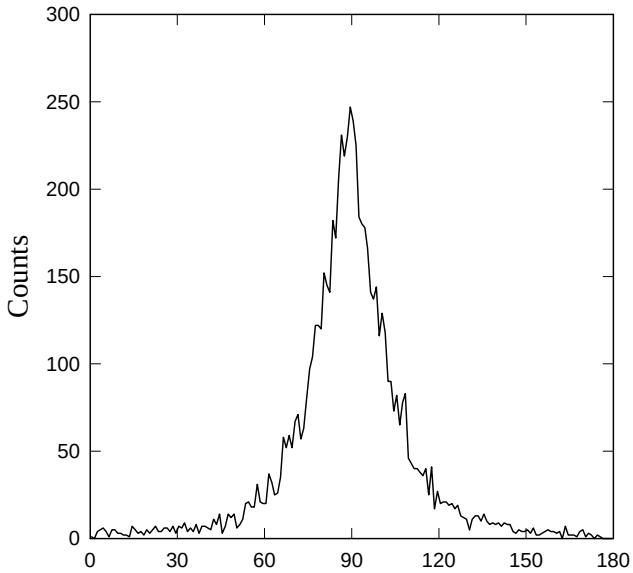
8 MeV/A Ni^{24+} + CO_2

TOF of 1st fragment

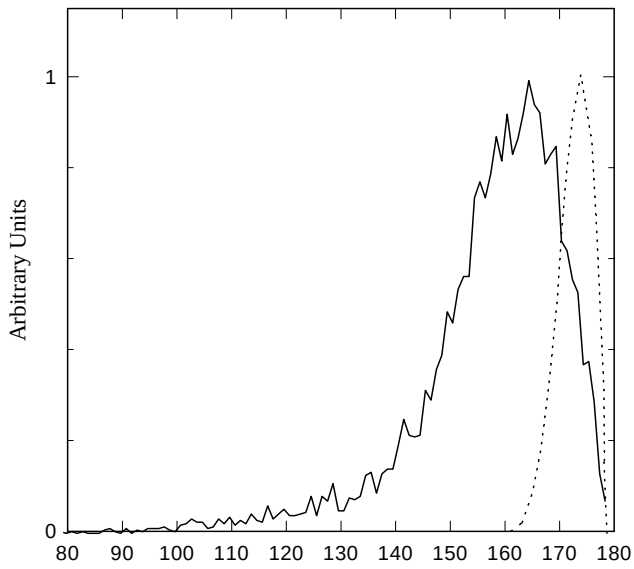
THE (CO_2) $^{3+}$ → C^+ + O^+ +O^+ CHANNEL





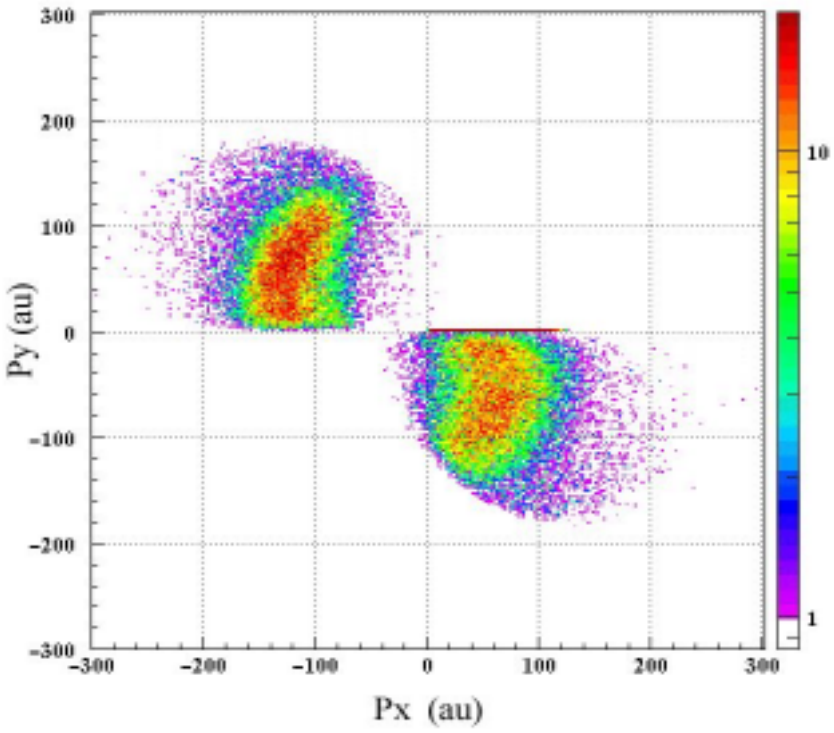


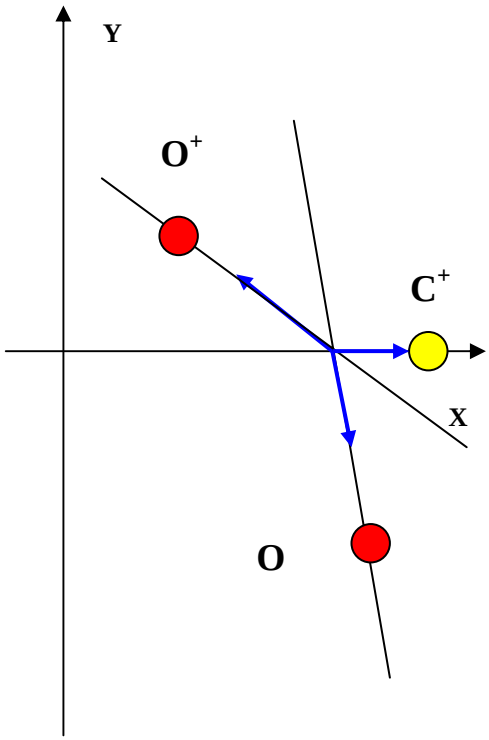
C^+, O^+-O^+ velocities angle (deg)

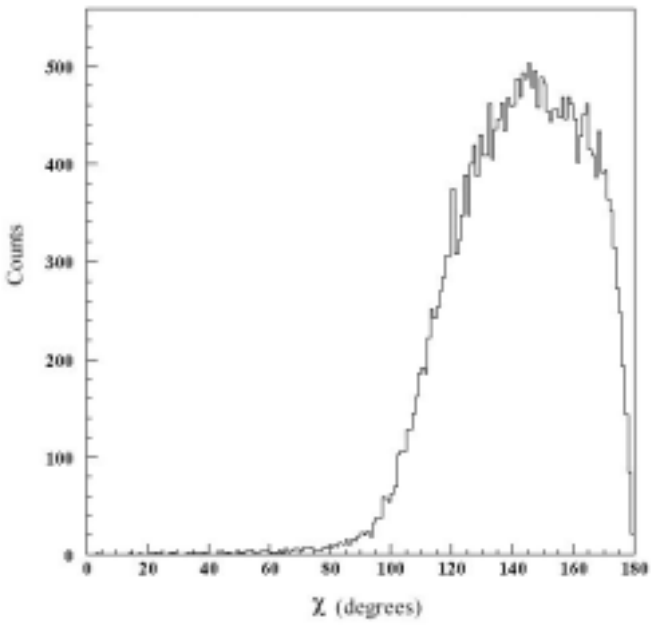


O^+, O^+ velocities angle (deg)

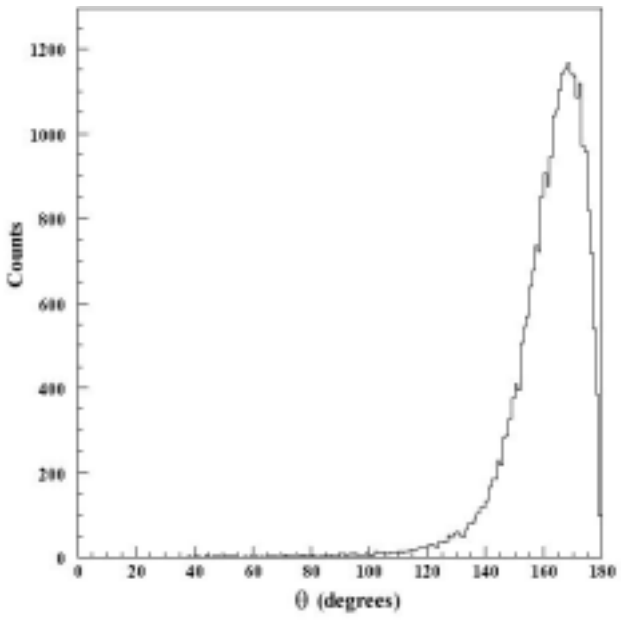
THE (CO_2) $^{2+} \rightarrow C^+ + O^+ + O$ CHANNEL





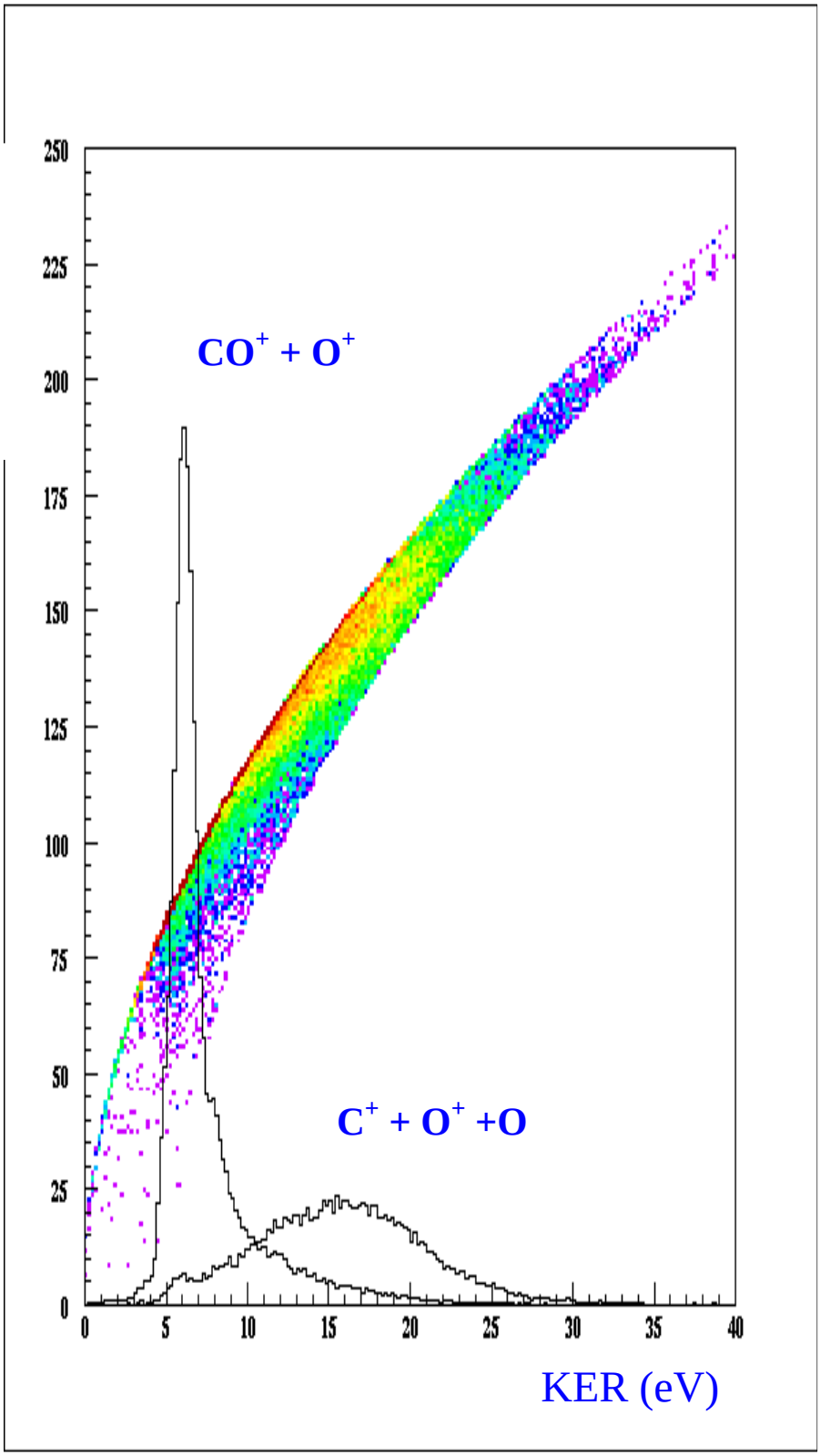


C^+, O^+-O velocities angle (deg)



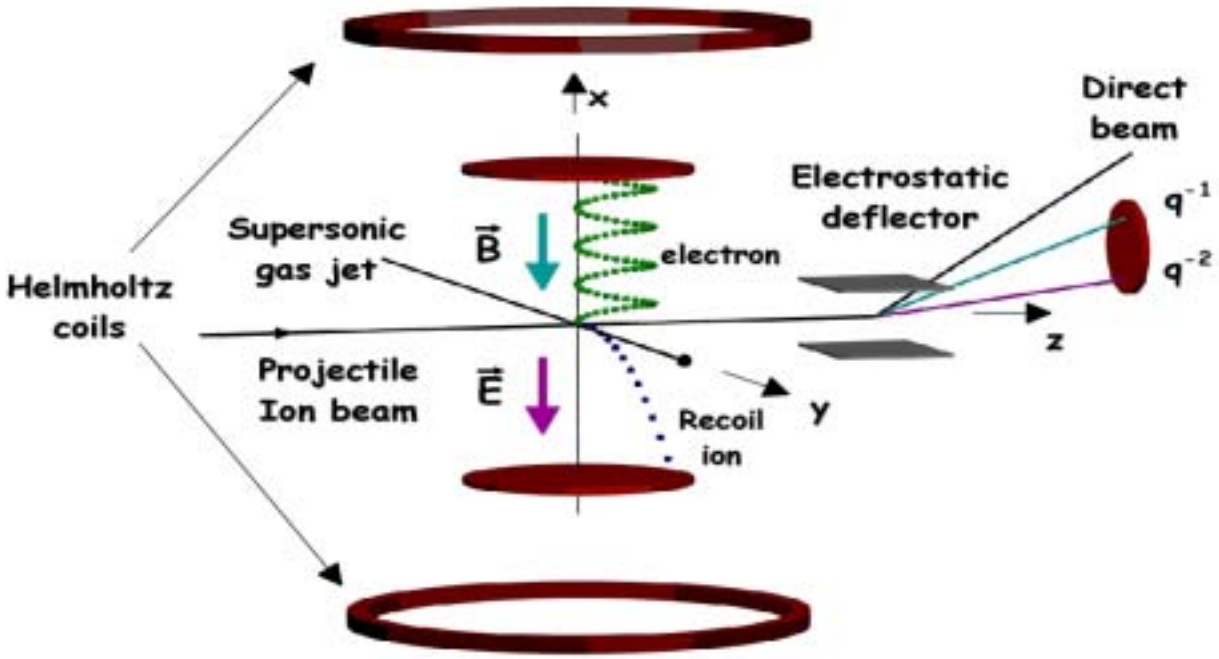
O^+, O velocities angle (deg)

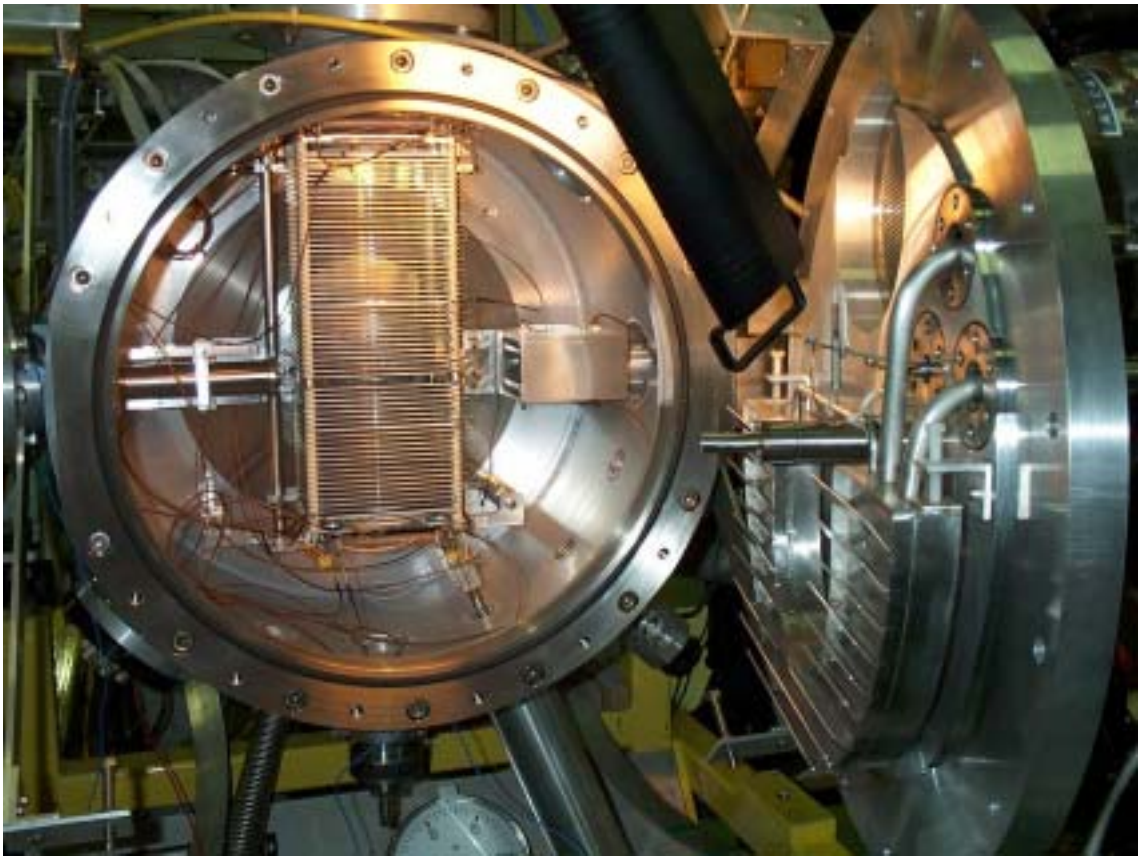
CO_2^{2+} FRAGMENTATION



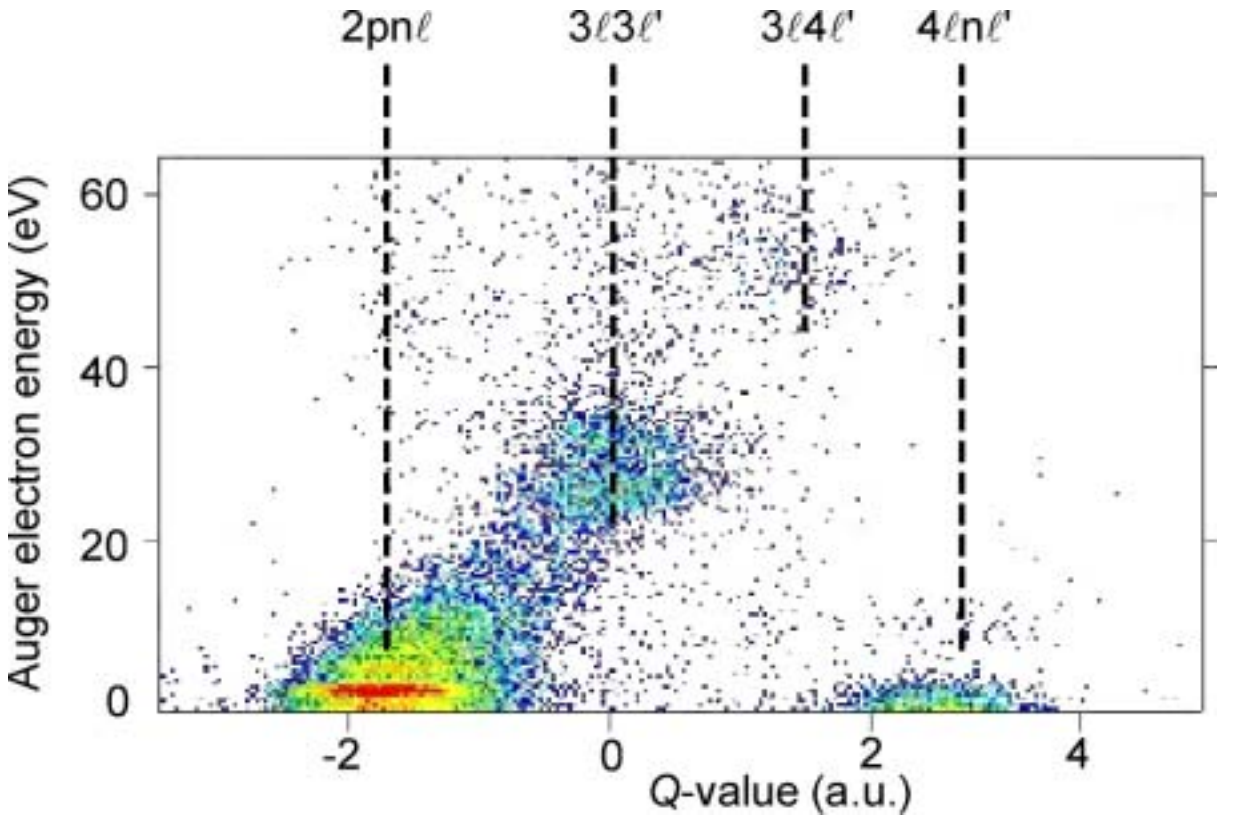
COINCIDENT ELECTRON AND RIM SPECTROSCOPY REACTION MICROSCOPE

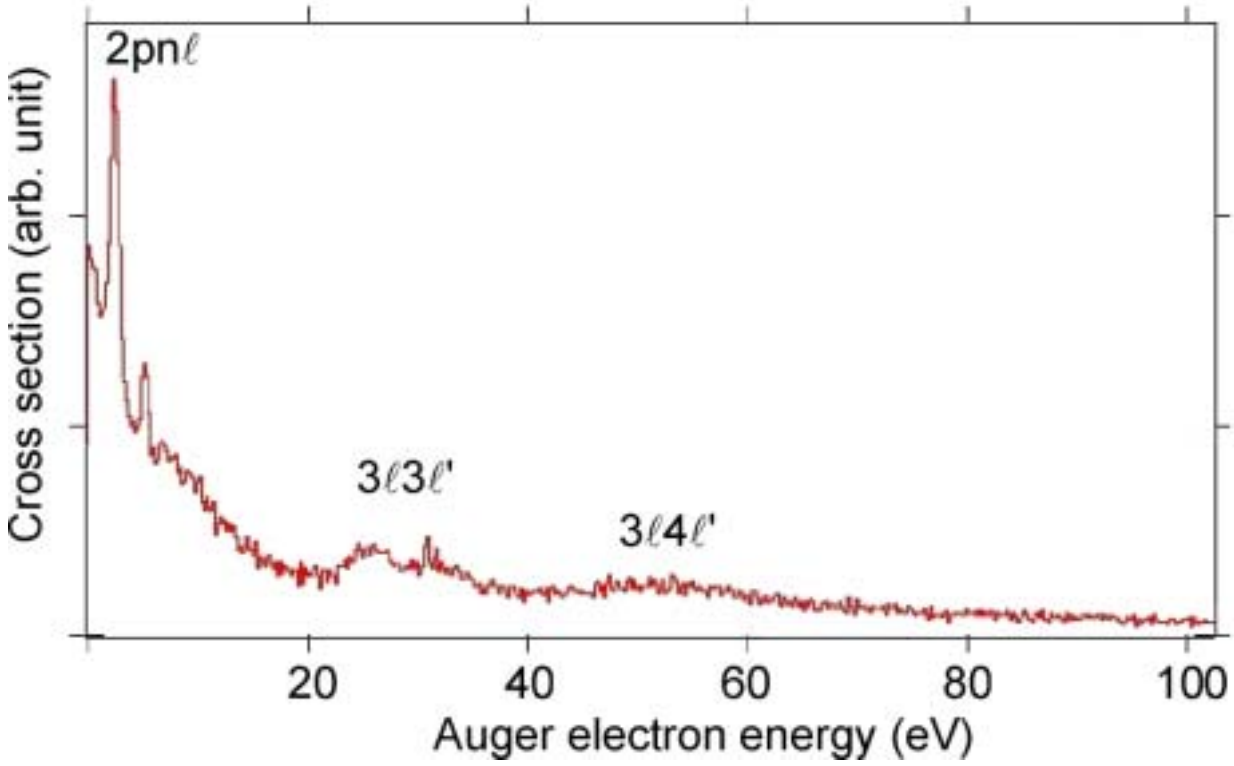
Rea





COINCIDENT RIM AND AUGER ELECTRON SPECTROSCOPY FOR THE SYSTEM 138 keV O^{6+}+He





FIELD FREE DETECTION DEVICE FOR THE STUDY OF H_2 MOLECULE FRAGMENTATION