Study of the isospin dependence of the temperature of different sources in the ^{78}Kr+^{40}Ca and ^{86}Kr+^{48}Ca reactions

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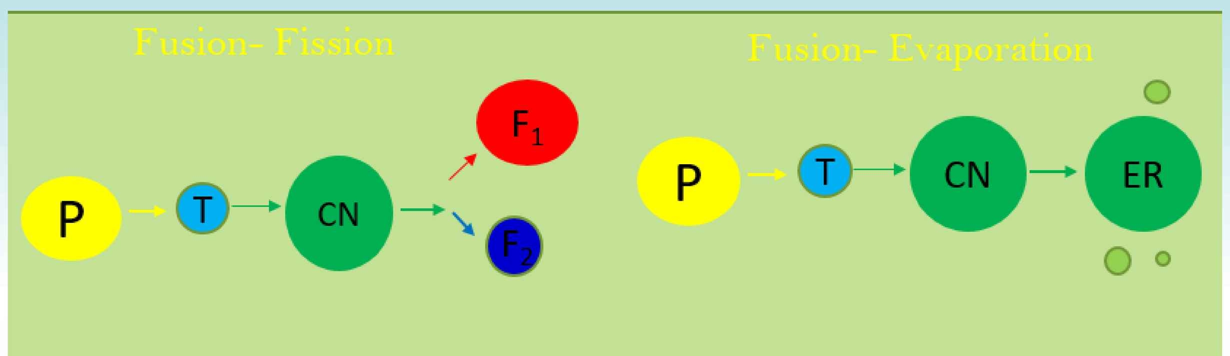
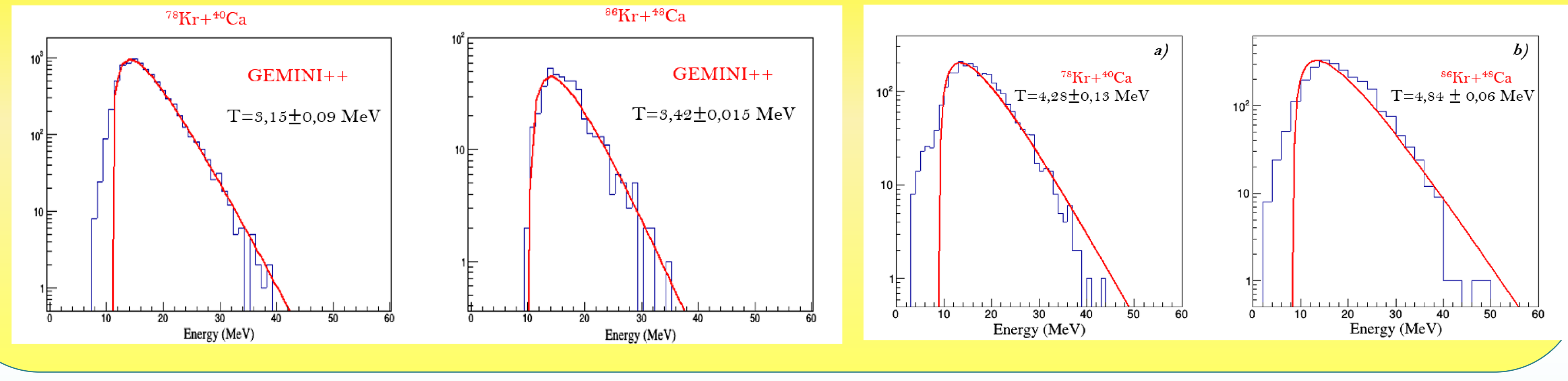
Thermal evaporation from Compound Nucleus for both system with two different thermometric methods: kinematic and chemical approaches

^{78}Kr + ^{40}Ca -> ^{118}Ba* (n-poor system)

^{86}Kr + ^{48}Ca -> ^{134}Ba* (n-rich system)



Slope Temperatures in ^{78}Kr+^{40}Ca and ^{86}Kr+^{48}Ca Fusion reactions

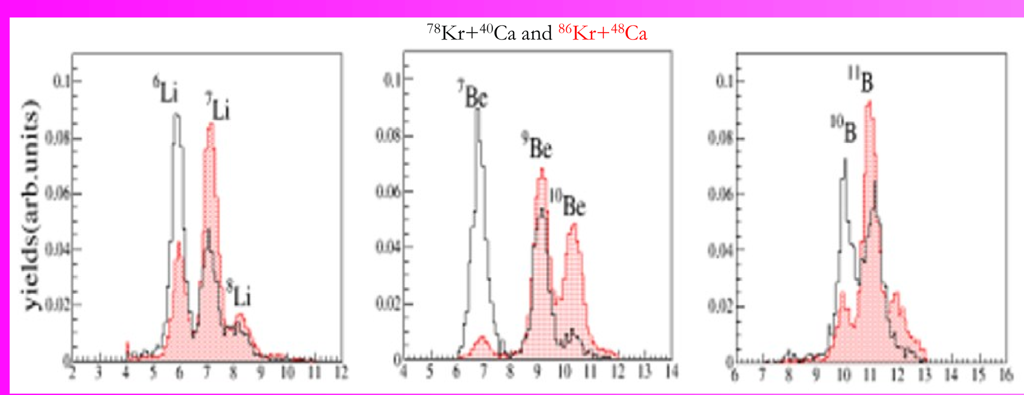


Temperature measured with double ratio of fragment isotopes yields

$$R = \frac{Y(A_i,Z_i)/Y(A_i+\Delta A,Z_i+\Delta Z)}{Y(A_j,Z_j)/Y(A_j+\Delta A,Z_j+\Delta Z)},$$

$$T_{\text{app}} = \frac{B}{\ln(a \cdot R_{\text{app}})}$$

$$\frac{1}{T_{\text{app}}} = \frac{1}{T_0} + \frac{\ln\kappa}{B}$$



Isotope ratio	a	B(MeV)	$(\ln\kappa/B)_{\text{expt}}$(MeV^{-1})
(^{13,14}C, ^{3,4}He)	0.73	12.39	0.0083
(^{6,7}Li, ^{3,4}He)	2.18	13.32	−0.0051(−0.025)
(^{9,10}Be, ^{3,4}He)	0.38	13.76	−0.084
(^{2,3}H, ^{3,4}He)	1.59	14.29	0.0097
(^{12,13}C, ^{3,4}He)	2.93	15.62	0.0143
(^{12,13}B, ^{3,4}He)	1.95	15.69	0.0601
(^{8,9}Li, ^{3,4}He)	1.24	16.51	0.0423
(^{11,12}B, ^{3,4}He)	1.11	17.20	0.0215
(^{1,2}H, ^{3,4}He)	5.60	18.4	0.0496
(^{7,8}Li, ^{3,4}He)	1.98	18.54	0.0265

H. Xi et al., Physics Letters B 431 (1998) 8–14

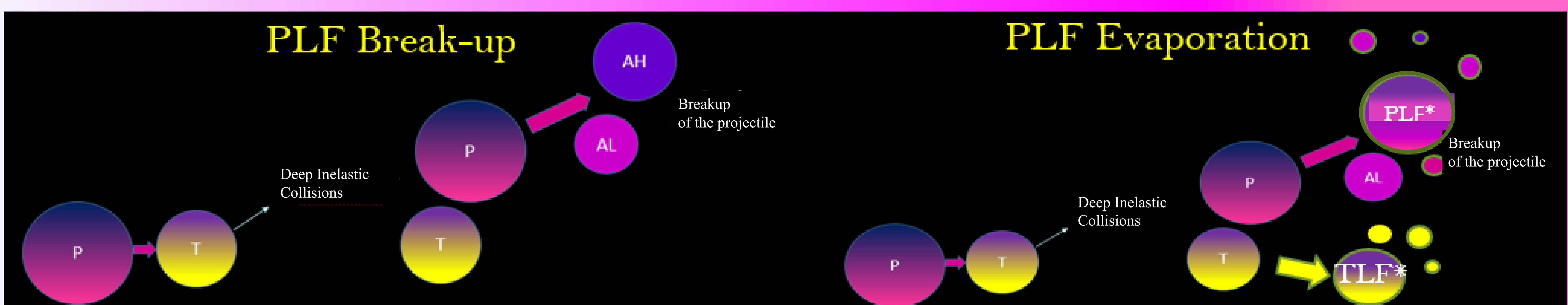
Isotope ratio	Temperature (MeV) ^{86}Kr+^{48}Ca	Temperature (MeV) GEMINI++
^{6,7}Li/^{3,4}He	2,72±0,06	2,92±0,12

Isotope ratio	Temperature (MeV) ^{78}Kr+^{40}Ca	Temperature (MeV) GEMINI++
^{6,7}Li/^{3,4}He	2,64±0,06	2,76±0,12

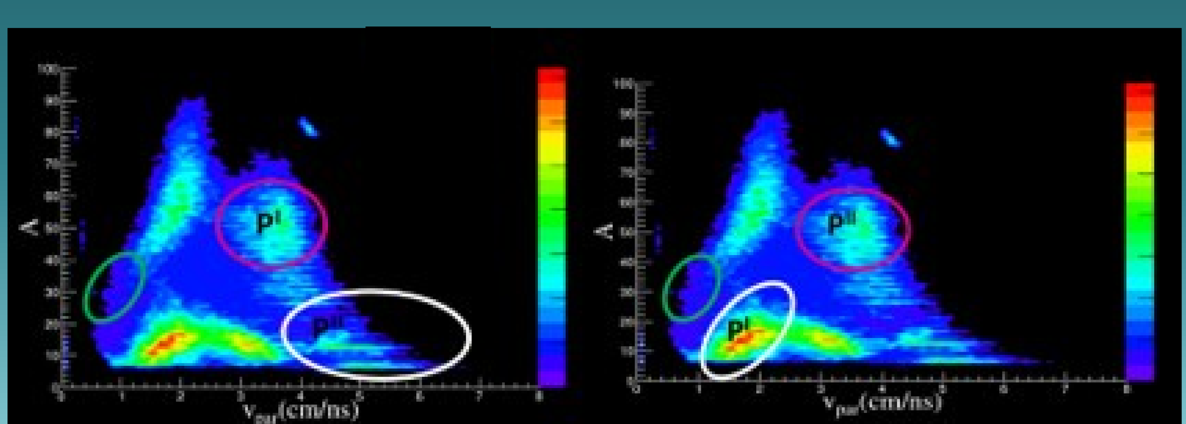
Isotope ratio	Temperature (MeV) ^{78}Kr+^{40}Ca	Temperature (MeV) ^{86}Kr+^{48}Ca
^{6,7}Li/^{3,4}He	2,64±0,06	2,72±0,06
^{9,10}Be/^{3,4}He	2,51±0,12	2,66±0,08

The reactions ^{78}Kr+^{40}Ca and ^{86}Kr+^{48}Ca have been realized at 10 AMeV at Laboratori Nazionali del Sud in Catania with the 4π multidetector CHIMERA. Depending on the impact parameter different reaction mechanisms were observed ,including the decay modes of the two produced composite systems and the competition between statistical and dynamical break-up of the projectile. The thermal evaporation from both compound nucleus (CN) and Quasi-Projectile Like Fragment (PLF) has been investigated by extracting the temperature with two different thermometric methods, namely the slope thermometer, with the alpha particles as probe, and the double isotope yields ratio thermometer. The results of the analysis suggest the influence of the N/Z ratio on the system (CN or PLF) temperature, independently of the method employed for its determination.

Thermal evaporation from Quasi Projectile for both system with kinematic thermometer



PLfF Break-up
Mass vs parallel velocity



Slope Temperatures of the Quasi-Projectiles in ^{78}Kr+^{40}Ca and ^{86}Kr+^{48}Ca