saddle points at a given asymmetry. In our first attempt we have assumed a Gaussian distribution of the saddle point populations peaked at the symmetry with the width corresponding to 30 units in mass. Having such a population of saddle points we ran a dynamical program with fluctuations (Langevin equations) from saddle to scission and look at masses and kinetic energies of fragments. Results of these calculations with a relatively poor statistics so far show very nice behaviour of the energy distribution being in a good agreement with the experiment (Fig. 2).

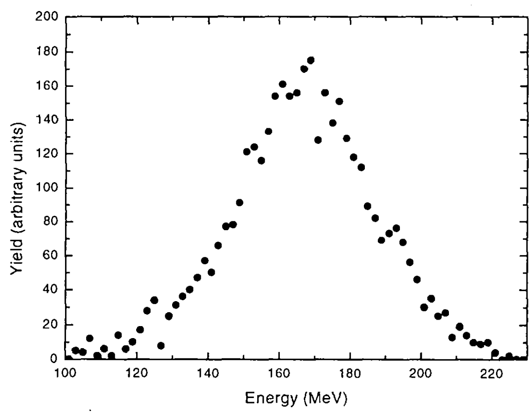

Fig. 2 Energy distribution of fission fragments.

For the mass distribution (Fig. 3) a trace of the desired peaks at $A_1 \sim 93$ and $A_2 \sim 143$ is observed, however still the most probable splitting is around symmetry. We are going to continue these investigations trying to make more meaningful assumptions for the initial conditions [1].

[1] J.R.Nix, W.J.Świątecki, "Studies in the liquid-drop theory of nuclear fission", Nuclear Physics 71(1965)1

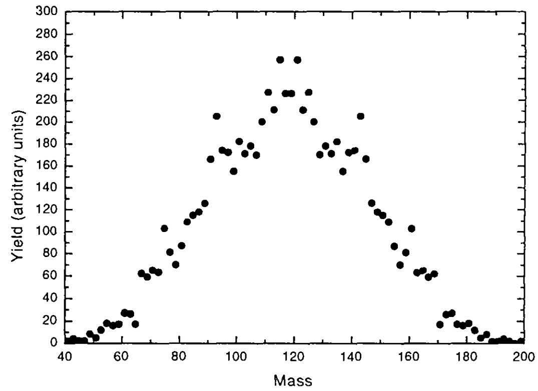

Fig. 3 Mass distribution of fission fragments.

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2.3 Deterministic and Langevin-dynamics Simulation of Deep Inelastic Nucleus-Nucleus Collisions

by J.Błocki, L.Shvedov, J.Wilczyński

Energy-angle distributions of deep-inelastic nucleus-nucleus collisions at moderate energies of about 10-15 MeV/nucleon reveal correlations between the average energy loss and the average scattering angle, which can be interpreted in terms of the "classical dissipative deflection function" - known as Wilczyński diagram. An example of this correlation measured [1] for the $^{86}Kr + {}^{166}Er$ reaction at $E(^{86}Kr)$ = 8.18 MeV/nucleon is shown in Fig. 1. Basic features of this correlation can be reproduced within our macroscopic dynamic model, in which we solve numerically the classic Lagrange-Rayleigh equations of motion in the distance-deformation space [2], assuming one-body dissipation mechanism [3], and using the Yukawa-plus-exponential folding potential [4] corrected for shell effects and exact nuclear masses [5]. Predictions of this classical model are shown in Fig. 1 by black squares indicating the calculated final energy and scattering angle for a given value of the angular momentum. The solid line joins results obtained for l-values in the range from l=160 to l=430. This line, representing the classical dissipative deflection function, perfectly follows the ridge in the landscape of the double differential cross section, $d^2\sigma/d\theta dE$, descending from the maximum for grazing collisions ($\ell \approx 350$) down to the region of deep-inelastic events occurring at smaller ℓ-values.

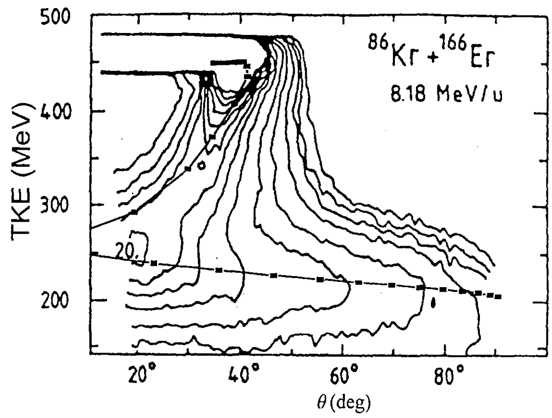

Fig. 1 Contour diagram of the double differential cross section $d^2\sigma/d\theta dE$ in the $^{86}Kr + {}^{166}Er$ reaction, as a function of the scattering angle and the total kinetic energy, compared with the dissipative deflection function calculated within our one-body dissipation model. The contour diagram of the cross-section distribution is taken from Ref. [1].

A more realistic description of the nucleus-nucleus dynamics requires inclusion of stochastic effects, first of all those associated with thermal fluctuations. In the proposed approach [6] we solve the Langevin equations of motion in which stochastic white-noise term is added to the Rayleigh conservative and dissipative forces used in our deterministic version of the model. The width of the thermal fluctuations is determined by the fluctuation-dissipation theorem (Einstein relation). The contour diagram of the energy-angle distribution of the events generated with the Langevin dynamics for the same $^{86}Kr + ^{166}Er$ reaction is shown in Fig. 2.

[1] A.Gobbi, W.Nörenberg, *Heavy Ion Collisions*, ed. R.Bock, North Holland, 1980, Vol. 2, p. 127
[2] J.Błocki, W.J.Świątecki, Report LBL-12811, Berkeley, 1982
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[4] H.J.Krappe, J.R.Nix, A.J.Sierk, Phys. Rev. C20 (1979) 992
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[6] J.Błocki, O.Mazonka, J.Wilczyński, Z.Sosin, A.Wieloch, Acta Phys. Pol. 31 (2000) 151

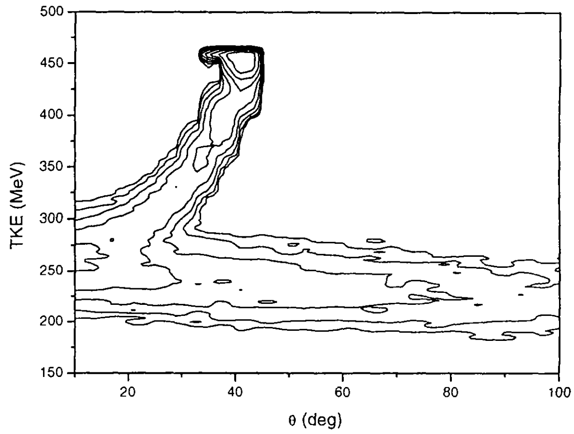

Fig. 2 Energy-angle distribution of the events generated with the Langevin dynamics for the $^{86}Kr+^{166}Er$ reaction at $E(^{86}Kr)$ = 8.18 MeV/nucleon

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2.4 Empirical Nucleus-Nucleus Potential Deduced From Fusion Excitation Functions

by K.Siwek-Wilczyńska[1)], J.Wilczyński

Existing data on near-barrier fusion excitation functions for 48 medium and heavy nucleus-nucleus systems have been analyzed using a simple "diffused-barrier formula" derived assuming the Gaussian shape for the barrier height distributions. Examples of selected fusion excitation functions analyzed in this way are shown in Fig. 1. The obtained mean values of the barrier height have been then used for determination of the parameters of the empirical nucleus-nucleus potential, assumed to have Saxon-Woods shape. (For details see Ref. [1].)

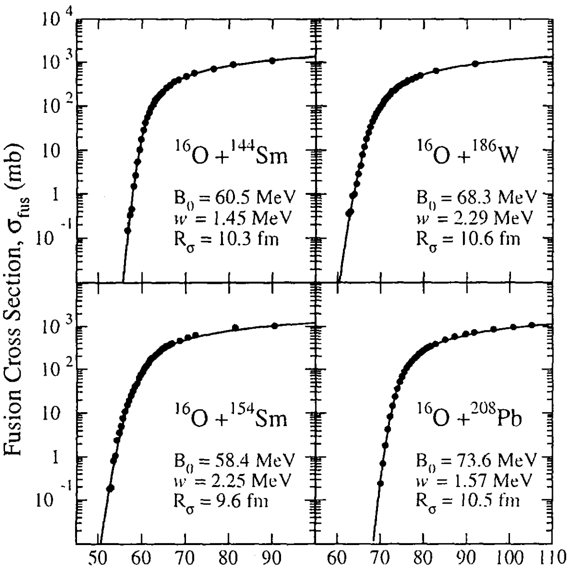

Fig. 1 Fusion excitation functions measured for the $^{16}O+^{144,154}Sm$ [2], $^{16}O+^{186}W$ [3], and $^{16}O+^{208}Pb$ [3] reactions (full circles) compared with predictions (solid lines) of the "diffused barrier formula" [1] for values of the mean barrier B_0, the barrier distribution width w, and the radius parameter R_σ obtained with the least-square method.

The mean barrier heights calculated with this potential are reproduced with an accuracy of about 1 MeV, while other frequently used potentials, i.e., the proximity potential and the Akyüz-Winther potential, considerably overpredict the experimental values, especially for heavy systems (see Fig. 2).

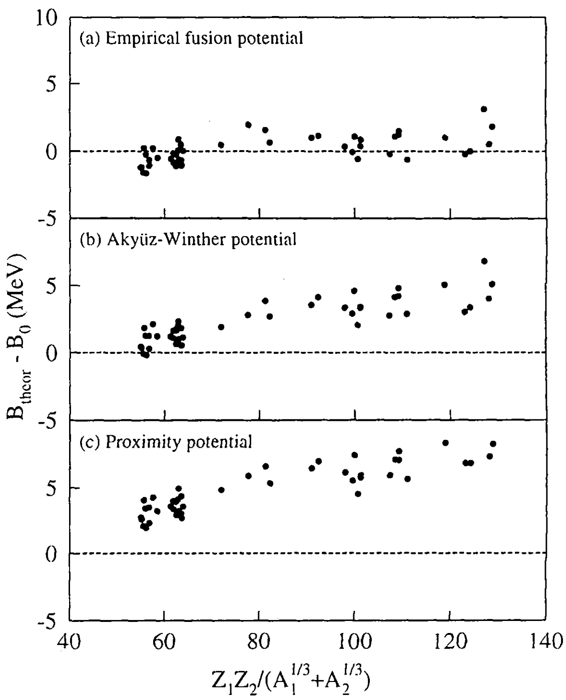

Fig. 2 Comparison of experimental barrier heights B_0 with theoretical predictions for the Akyüz-Winther potential [4], proximity potential [5] and the proposed "empirical potential".

In order to predict fusion excitation functions with the "diffused-barrier formula", we propose a simple method of theoretical prediction of the second