

# A consistent description of the heavy-ion fusion and elastic scattering processes using a nonlocal model

L. R. Gasques<sup>1</sup>, L. C. Chamon<sup>1</sup>, D. Pereira<sup>1</sup>, M. A. G. Alvarez<sup>1</sup>, E. S. Rossi Jr.<sup>1</sup>,  
C. P. Silva<sup>1</sup>, B. V. Carlson<sup>2</sup>

<sup>1</sup>Instituto de Física da Universidade de São Paulo 05315-970, São Paulo, S.P., Brazil

<sup>2</sup>Departamento de Física, Instituto Tecnológico de Aeronáutica, São José dos Campos, S.P., Brasil

We have developed a model for the real part of the nuclear interaction [1, 2, 3], which is based on the effect of the Pauli non-locality. This model has been used to describe elastic scattering data in a wide range of bombarding energies. In the present work, we have performed a full barrier penetration model calculation using the non-local potential (see figure 1 as example). For the heavy-ion systems with reduced mass  $\mu \geq 8$  the sub-barrier enhancement is not connected to the Pauli non-locality, but to the Feshback non-locality with different non-locality range. The connection between this effect and coupled channel calculations will be discussed. We will also present the description of fusion cross section for 165 heavy-ion systems including some involving exotic nuclei.

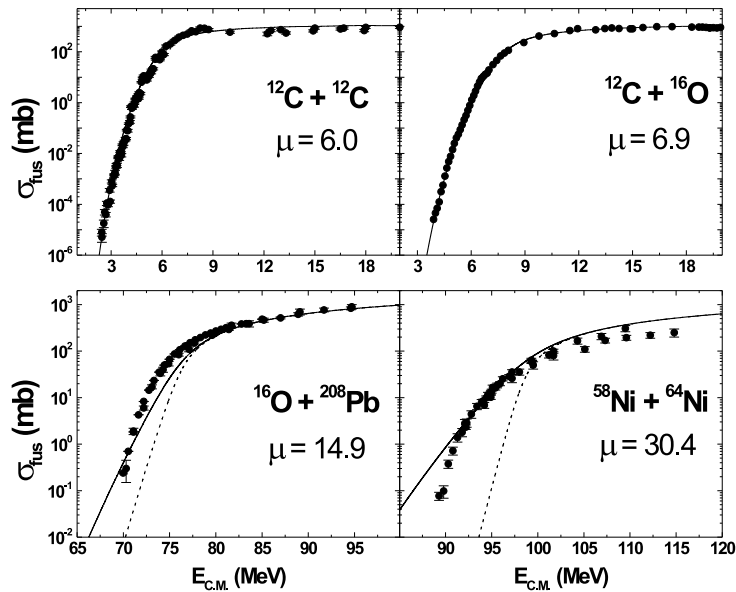


Figure 1: The fusion cross section for the  $^{12}\text{C} + ^{12}\text{C}$ ,  $^{12}\text{C} + ^{16}\text{O}$ ,  $^{16}\text{O} + ^{208}\text{Pb}$  and  $^{58}\text{Ni} + ^{64}\text{Ni}$  systems. The lines represent full barrier penetration model calculations with (solid lines) or without (dashed lines) including the effect of the effective curvatures.

[1] L. C. Chamon et al, Phys. Rev. Lett. **79**, 5218 (1997)

[2] M. A. Candido Ribeiro et al, Phys. Rev. Lett. **78**, 3270 (1997)

[3] L. C. Chamon et al, Phys. Rev. **C66**, 014610 (2002)