

would then dismiss the $\delta(x)^2$ ambiguity. Under such conditions, a new set of ordering ambiguity parameters (the only feasibly admissible within the current methodical proposal, and the yet to be labeled as MM1-ordering, hereinafter) that casts $\alpha = \gamma = -3/4$ and $\beta = 1/2$ is obtained. As such and within this new set of ambiguity parameters, the effective potential (13) collapses into a simple form

$$V_{eff}(q(x)) = \frac{U(0)}{2}\delta'(x) ; \quad U(x) = \frac{f'(h(x))}{f(h(x))^2}. \quad (14)$$

We clearly observe that a scattering problem of a quasi-free quantum particle (i.e., $V(x) = 0$ whereas $V_{eff}(q(x)) \neq 0$) subjected to the derivative of the one-dimensional Dirac delta interaction (also called the point dipole interaction) is manifested by (14) of Hamiltonian (7) (hence, a self-scattering effect obtains in the process). The detailed solution of which can be inferred from the scattering coefficients of the $V(q) = -a\delta(q) + b\delta'(q)$ potential of Gadella et al. [36] by taking $m = 1$, $a = 0$ and $b = U(0)/2$ as proper parametric mappings into our model. Choosing to skip all the mathematical and/or physical details, the reflection and transmission coefficients (see Eq.(23) of [36]) would, respectively, read

$$R = -\frac{4U(0)}{4 + U(0)^2} \quad (15)$$

and

$$T = \frac{4 - U(0)^2}{4 + U(0)^2} \quad (16)$$

In a straightforward manner it can be easily shown that the condition $|R|^2 + |T|^2 = 1$ is satisfied. Consequently, a free quantum particle endowed with the PDM-setting of (2) may very well experience scattering effects. Moreover, it is obvious that whilst a $U(0) = 0$ yields (although trivial) a totally transparent/reflectionless derivative-of-the-Dirac's delta scatterer, a $U(0) = \pm 2$ yields a totally reflective derivative-of-the-Dirac's delta scatterer.