normalization factors for generalized gaussians:

$$\int_{-\infty}^{\infty} \mathrm{e}^{-\frac{x^2}{a}} \mathrm{d}x = \sqrt{\pi a}$$

$$\int_{-\infty}^{\infty} \mathrm{e}^{-\frac{x^2}{a}-ikx} \mathrm{d}x = \mathrm{e}^{-\frac{k^2 a}{4}} \sqrt{\pi a}$$

gaussian evolution:

$$\psi = \mathrm{e}^{-\frac{(x-x_c)^2}{a}-ik(x-x_c)+c} = g\mathrm{e}^{-\frac{(x-x_c)^2}{a}-ik(x-x_c)}; \qquad g = \mathrm{e}^c$$

$$\mathcal{H} = -\frac{1}{2m}\frac{\partial^2}{\partial x^2} + v_0 + v_1(x-x_c)$$

$$i\psi(\frac{\dot{a}}{a^2}(x-x_c)^2 + 2(x-x_c)\frac{\dot{x}_c}{a} - i\dot{k}(x-x_c) - ik\dot{x}_c + \dot{c}) =$$
$$(v_0 + v_1(x-x_c) - \frac{2}{a^2 m}(x-x_c)^2 - \frac{k^2}{2m} + \frac{2ik}{ma}(x-x_c) + \frac{1}{ma})\psi$$

$$\left\{\begin{array}{lcl} a' & = & -\frac{2i}{m} \\ x_c' & = & \frac{k}{m} \\ k' & = & -v_1 \\ c' & = & iv_0 - \frac{ik^2}{2m} + \frac{i}{ma}; \qquad g' = c'g \end{array}\right.$$

sampling for gaussian functions

$$\int_{-\infty}^{\infty} \mathrm{e}^{-\frac{(y-z)^2}{p}-iky} \mathrm{e}^{-\frac{z^2}{q}} \mathrm{d}z = \int_{-\infty}^{\infty} \mathrm{e}^{-\frac{p+q}{pq}\theta^2 - \frac{y^2}{p+q} - iky} \mathrm{d}\theta = \sqrt{\pi\frac{pq}{p+q}} \mathrm{e}^{-\frac{y^2}{p+q}-iky}; \qquad \theta = z - \frac{q}{p+q}y$$

$$\int_{-\infty}^{\infty} \mathrm{e}^{-\frac{(y-z)^2}{p}-iky} \mathrm{e}^{-\frac{z^2}{q}} \mathrm{d}z = g\mathrm{e}^{-\frac{(x-x_c)^2}{a}-ik(x-x_c)}$$

$$\left\{\begin{array}{lcl} a & = & p+q \\ g & = & \sqrt{\pi\frac{pq}{p+q}} \\ y & = & x - x_c \end{array}\right.$$