In d-dimensions

Wavepacket: $|\psi(t=0)\rangle$

$$\langle \vec{x}|\psi(0)\rangle = \psi(\mathrm{x},0) = \mathcal{N}\exp\Big[-\frac{(\vec{x}-\vec{x}_0)^2}{4(\Delta x)^2} + i\vec{k}_0.\vec{x} + i\phi\Big]$$

where $\mathcal{N} = (2\pi\Delta x^2)^{-d/4}$

Moments:

$$\langle \vec{x}\rangle = \vec{x}_0$$
$$\langle \vec{x}.\vec{x}\rangle = d(\Delta x)^2 + \vec{x}_0^2$$
$$\Delta r \equiv \sqrt{\langle \vec{x}.\vec{x}\rangle - \langle\vec{x}\rangle\langle\vec{x}\rangle} = \sqrt{d}\Delta x$$
$$\langle x_i^2\rangle = \Delta x^2 + (x_0)_i^2$$

$$\langle \vec{p}\rangle = \hbar\vec{k}_0$$
$$\langle p_i^2\rangle = \frac{\hbar^2}{4\Delta x^2} + \hbar(k_0)_i^2$$
$$\Delta p_i \equiv \sqrt{\langle p_i^2\rangle - \langle p_i\rangle^2} = \frac{\hbar}{2}\frac{1}{\Delta x}$$

Wavepacket in momentum space:

$$\langle \vec{k}|\psi(0)\rangle = \psi(\mathrm{x},0) = \mathcal{N}_k\exp\Big[-\frac{(\vec{k}-\vec{k}_0)^2}{4(\Delta k)^2} - i(\vec{k}-\vec{k}_0).\vec{x}_0 + i\phi\Big]$$

where $\mathcal{N}_k = (2\pi\Delta k^2)^{-d/4}$

In 3-dimensions

Partial wave series of wavepacket: Assuming $\vec{k}_0$ collinear to $\vec{x}_0$,

$$\begin{aligned}\langle \vec{x}|\psi(0)\rangle &= \int_0^\infty dk \sum_{\ell,m}\langle\vec{x}|k\ell m\rangle\langle k\ell m|\psi(0)\rangle \\ &= \mathcal{N}e^{-\frac{(r^2-x_0^2)}{4\Delta x^2}+i\phi}\sum_\ell i^\ell(2\ell+1)j_\ell(k_0 r - \frac{ix_0 r}{2(\Delta x)^2})P_\ell(\cos\theta)\end{aligned}$$

with partial wave expansion coefficient

$$\begin{aligned}\langle k\ell m|\psi(0)\rangle &= \psi_{k\ell m}(t=0) \\ &= \mathcal{N}_k\, i^\ell k\sqrt{4\pi(2\ell+1)}\, e^{-\frac{k^2+k_0^2}{4\Delta k^2}}\, j_\ell\Big(-k(x_0+\frac{ik_0}{2\Delta k^2})\Big)\,\delta_{m,0}\, e^{+ik_0x_0+i\phi}\end{aligned}$$