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3D structure of nucleon with virtuality distributions[1]

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We describe a new approach to transverse momentum dependence in hard processes. Our starting point is coordinate representation for matrix elements of operators (in the simplest case, bilocal $\mathcal{O}(0,z)$) describing a hadron with momentum p. Treated as functions of (pz) and z^2, they are parametrized through *parton virtuality distribution* (PVD) $\Phi(x,\sigma)$, with x being Fourier-conjugate to (pz) and σ Laplace-conjugate to z^2. For intervals with $z^+ = 0$, we introduce the *transverse momentum distribution* (TMD) $f(x,k_\perp)$, and write it in terms of PVD $\Phi(x,\sigma)$. The results of covariant calculations, written in terms of $\Phi(x,\sigma)$ are converted into expressions involving $f(x,k_\perp)$. We propose models for soft PVDs/TMDs,and describe how one can generate high-$k_\perp$ tails of TMDs from primordial soft distributions.

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