

# Tomography of high energy processes with heavy quarkonia probes

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## Introduction and Abstract

Understanding the structure of hadrons and their interactions is one of the major unsolved problems in QCD. This structure is conventionally encoded in terms of the parton distributions of the hadrons. Its extraction from experimental data requires analysis of multiple production channels. Most challenging is the understanding of the gluonic content of the target, which is usually studied via production of heavy quarkonia states, or heavy open flavour mesons.

In this talk we briefly overview various channels used for theoretical studies of heavy flavour production, and summarize our recent theoretical studies of inclusive and exclusive production of heavy quarkonia. For inclusive channels, we discuss possible contributions of multigluon exchanges in  $t$ -channel, and possibility to disentangle their contributions via studies of quarkonia states ( $J/\psi$ ,  $\eta_c$ ,  $\Upsilon$ ) in high-multiplicity production [1-4]. In exclusive channels, we focus on production of heavy quarkonia pairs in back-to-back kinematics. We estimate the cross-sections for various quarkonia pairs using two complementary approaches. In the small- $x_B$  kinematics, where saturation effects are important, we use the color dipole framework, which naturally incorporates these nonlinear phenomena [5,6]. For the kinematics of moderate values of  $x_B$ , which might be relevant for the future Electron Ion Collider, we make estimates using the collinear factorization approach, and discuss possibility to study the gluon GPDs from these channels.

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