

IHEP Diffractive Group

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ExDiff

Monte-Carlo event generator
for Exclusive Diffractive Processes

Roman Ryutin

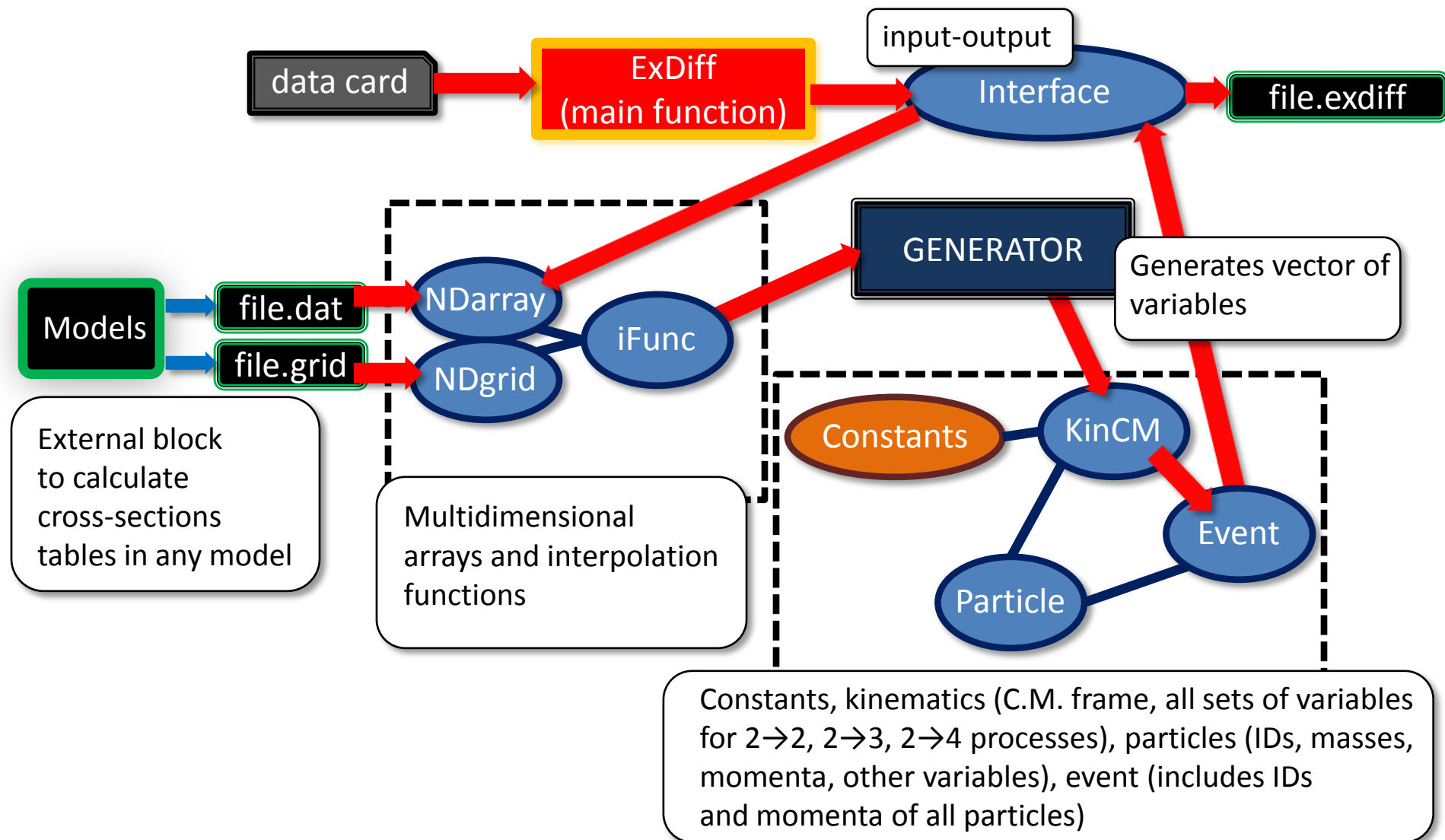
IHEP, Protvino

Generators for Forward Physics

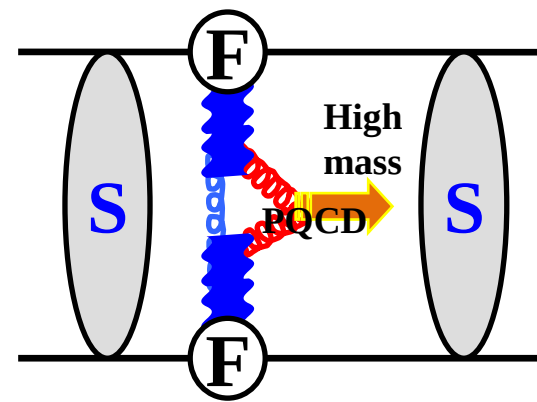
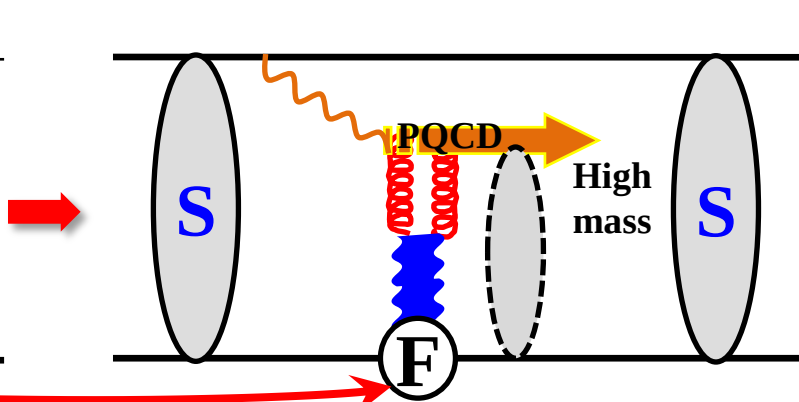
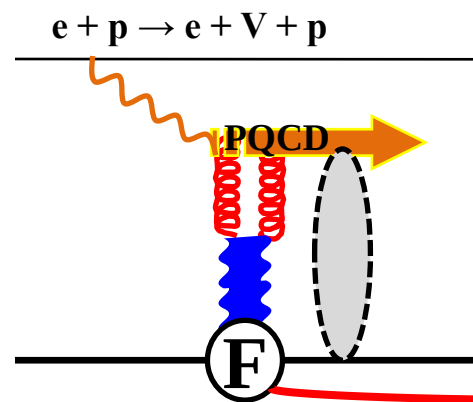
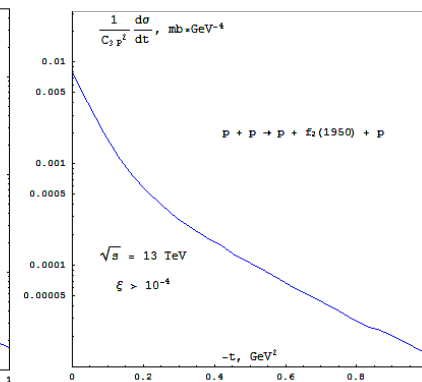
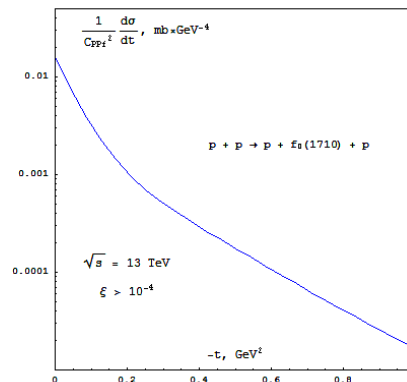
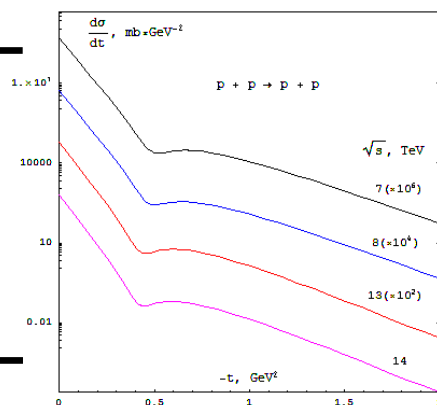
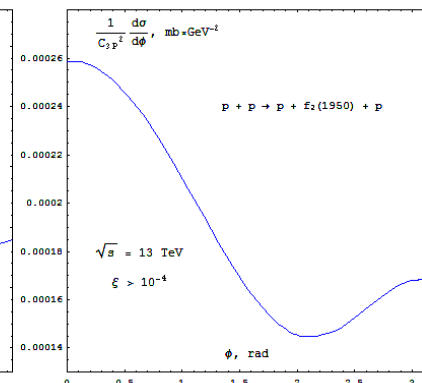
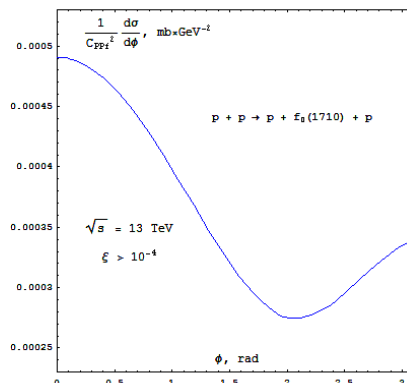
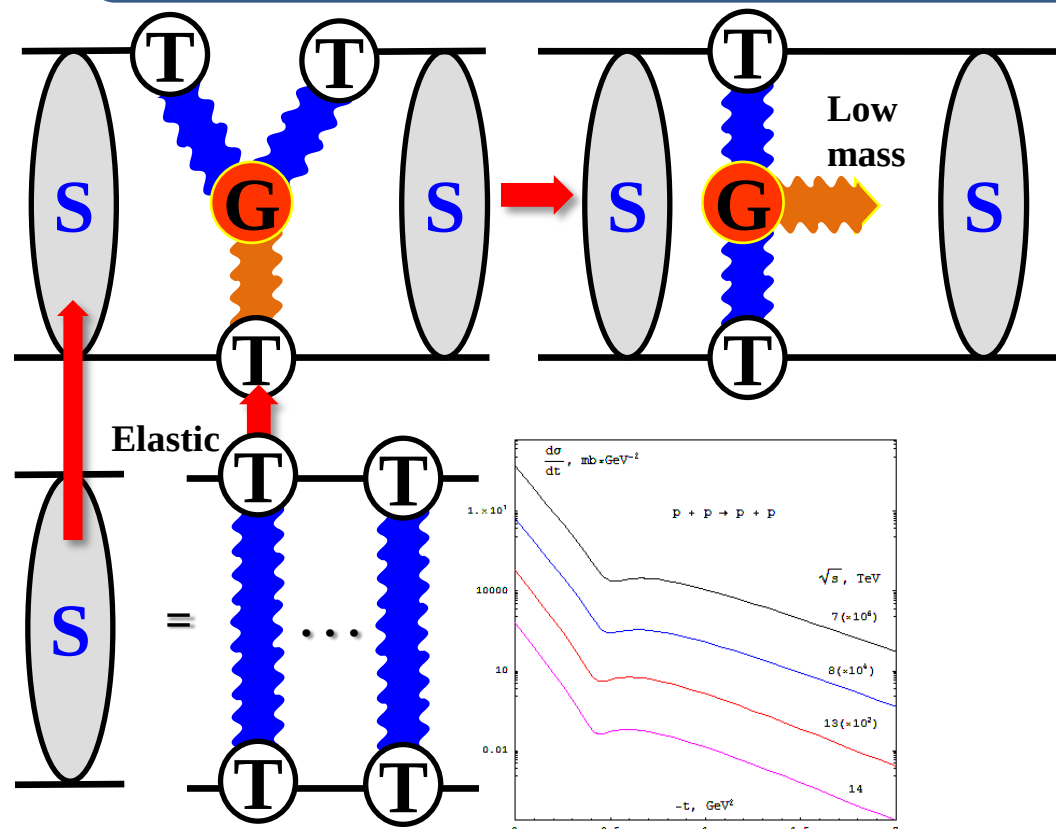
<https://twiki.cern.ch/twiki/bin/viewauth/CMS/CTPPSMC>

Parameter	ExHuMe (Super Chic)	FPMC	ExDiff
Type	Standalone	Standalone	Standalone
Program. Lang.	C++ (FORTRAN)	C++, FORTRAN	C++
Simple interface	Yes (More complicated)	More complicated	Yes
Input	data card	data card	data card
Process	Excl. $p+p \rightarrow p+X+p$	Excl. $p+p \rightarrow p+X+p$ Incl. $p+p \rightarrow p+X+p+(\text{IP remn.})$ Incl. $p+p \rightarrow p+X+(\text{IP\&p remn.})$	Excl. $p+p \rightarrow p+p$ (elastic) Excl. $p+p \rightarrow p+X+p$
Subprocess	$g+g \rightarrow H, gg, \gamma\gamma, QQbar$ ($H, \chi_{c,b}, \eta_{c,b}, 2J/\psi, 2\psi, \eta\eta'$)	$\gamma+\gamma \rightarrow \ell\ell, WW, ZZ$ $g+g \rightarrow H, gg, QQbar, \gamma\gamma, \chi_{c,b}$ $\gamma+IP(g) \rightarrow Z, \gamma$	$IP+IP \rightarrow f_0(1710), f_2(1950), \pi\pi, \dots$ $\gamma+IP(g) \rightarrow Z, \gamma, J/\psi, \dots$ $g+g \rightarrow H, gg, \gamma\gamma, QQbar, ggg,$ $\chi_{c,b}, \eta_{c,b}, 2J/\psi, 2\psi, \eta\eta', \text{Grav.}, ZZ, WW$
X mass	High	High	High, <u>Low</u>
C.M. energy (TeV)	LHC 7, 13, ..., CDF 2, any	any?	LHC 13 (all), 2.76, 7, 8 (elastic), CDF 1.8, 1.9, any...
Models	KMR + (PQCD, SM)	KMR, Ingelman-Schlein, R. Cudell et al. + (PQCD, SM)	Regge-eikonal model(s) + (PQCD, SM) <u>+ any other models!</u>
Hadronization	Pythia	Herwig	Pythia (in progress)
Output	HEPMC	HEPMC, Herwig	intrinsic, HEPMC (in progress)
Basic principles	Internal calc., PDFs tables	Internal calc., Diff. PDFs tables	Tables, External calculations

ExDiff basic structure (classes & files)



ExDiff models



TO DO list (2017)

- Interface to Pythia and CMS software. HEPMC output.
- Manual & twiki-page
- Processes to add
 - low mass process $p + p \rightarrow p + \pi\pi + p$ with the sub process
 $IP + IP \rightarrow \pi + \pi$
 - high mass processes $p + p \rightarrow p + X + p$, with sub processes
 $g(IP) + g(IP) \rightarrow H, R, \text{Graviton}, \chi_{c,b},$
 $gg, QQbar, \gamma\gamma, \psi\psi, \eta\eta', ZZ, WW, \dots$
 - high mass processes $p + p \rightarrow p + X + p$, with sub processes
 $\gamma + IP(g) \rightarrow Z, \Upsilon, J/\psi, \dots$
- Theoretical model development