Field-Stuart-Haas PRD

Charged Particle Data

WYSIWYG
What you see is what you get.
Almost!

QCD Monte-Carlo

Select "clean" region

Look only at the charged particles measured by the CTC.

Make efficiency corrections

- **Zero or one vertex**
- **$|z_c - z_v| < 2$ cm, $|\text{CTC } d_0| < 1$ cm**
- **Require $P_T > 0.5$ GeV, $|\eta| < 1$**
- **Assume a uniform track finding efficiency of 92%**
- **Errors include both statistical and correlated systematic uncertainties**

compare

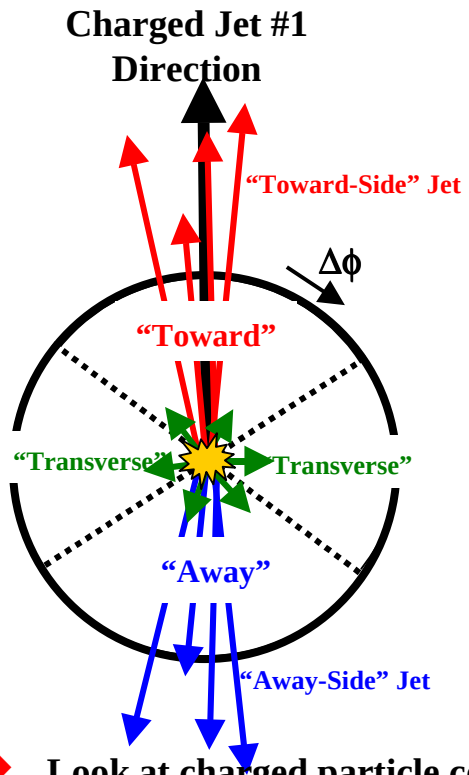
- **Require $P_T > 0.5$ GeV, $|\eta| < 1$**
- **Make an 8% correction for the track finding efficiency**
- **Errors (statistical plus systematic) of around 5%**

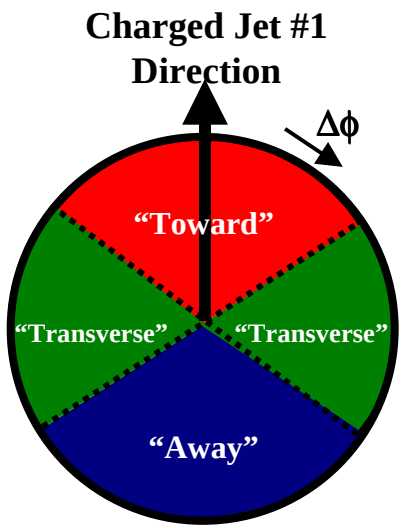
Uncorrected data

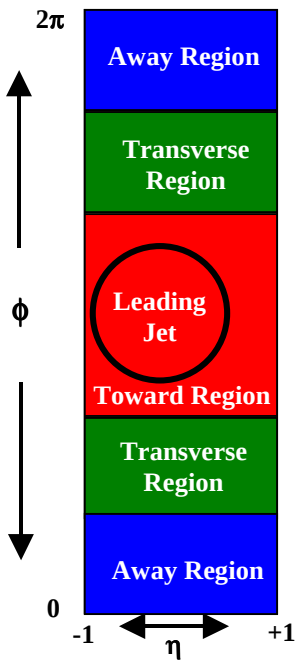
Corrected theory

Small Corrections!

Charged Particle Δϕ Correlations

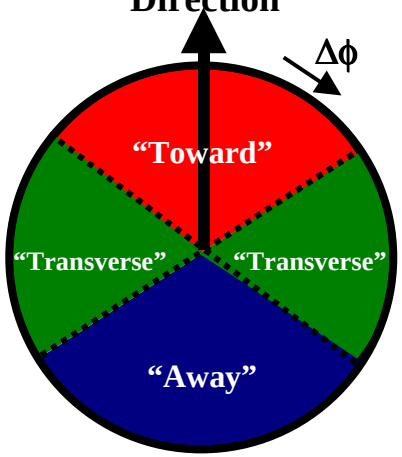


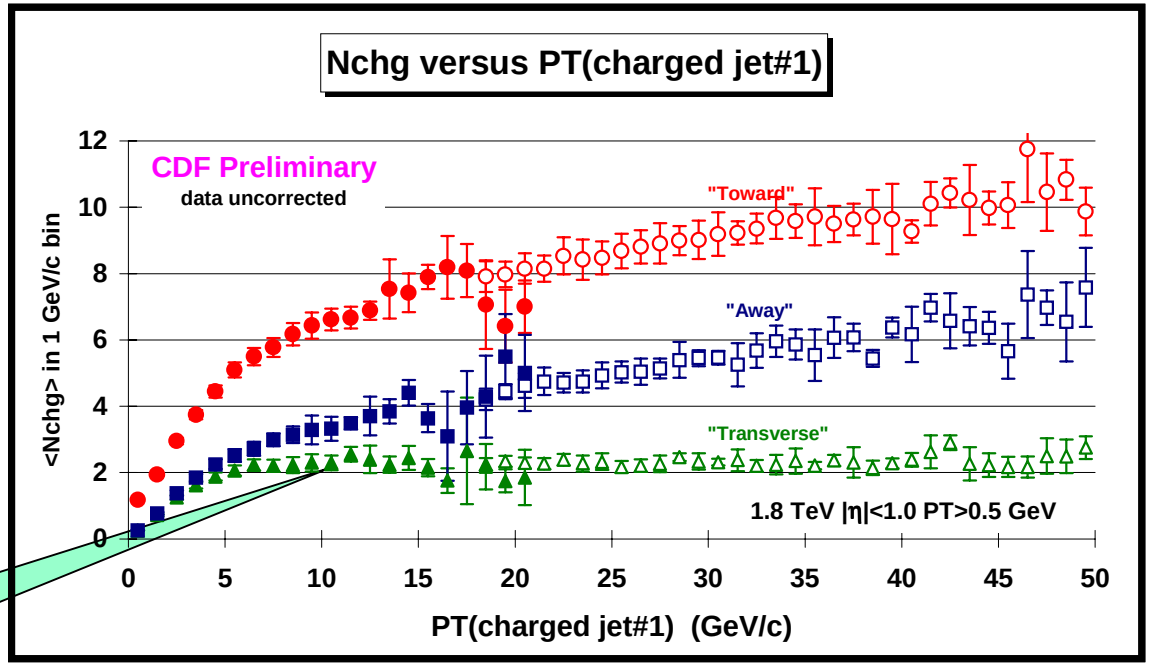




- Look at charged particle correlations in the azimuthal angle Δϕ relative to the leading charged particle jet.
- Define $|\Delta\phi| < 60^o$ as "Toward", $60^o < |\Delta\phi| < 120^o$ as "Transverse", and $|\Delta\phi| > 120^o$ as "Away".
- All three regions have the same size in η-ϕ space, $\Delta\eta x \Delta\phi = 2x120^o = 4\pi/3$.

Charged Multiplicity versus P_T(chgjet#1)



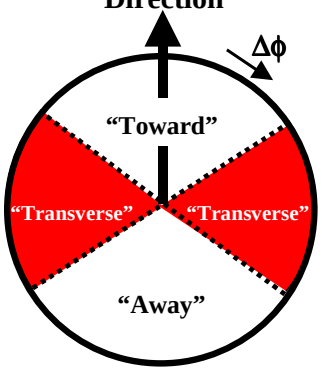


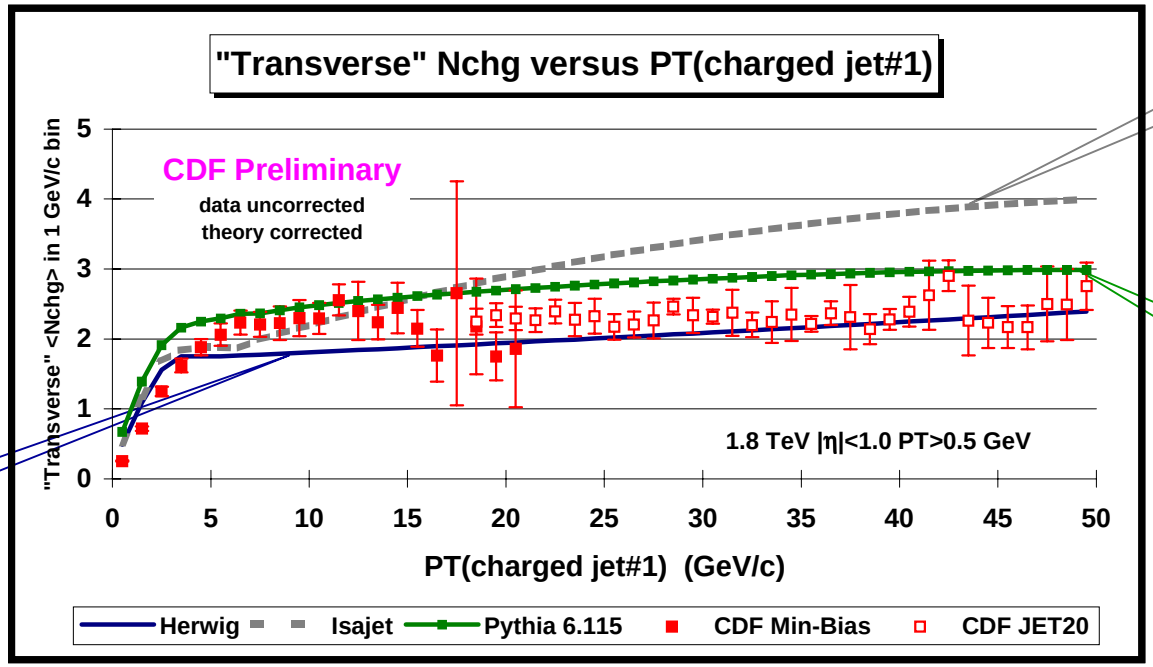
Underlying Event "plateau"

Blessed on 11/3/99

- **Data on the average number of "toward" ($|\Delta\phi|<60^o$), "transverse" ($60<|\Delta\phi|<120^o$), and "away" ($|\Delta\phi|>120^o$) charged particles ($P_T > 0.5$ GeV, $|\eta| < 1$, including jet#1) as a function of the transverse momentum of the leading charged particle jet. Each point corresponds to the <Nchg> in a 1 GeV bin. The solid (open) points are the Min-Bias (JET20) data. The errors on the (*uncorrected*) data include both statistical and correlated systematic uncertainties.**

"Transverse" Nchg versus P_T(chgjet#1)

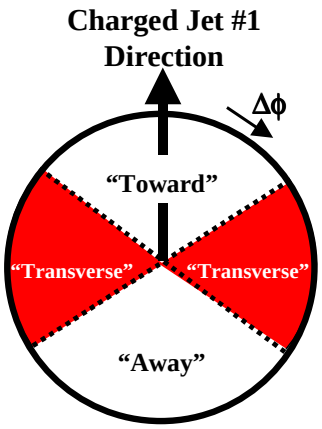


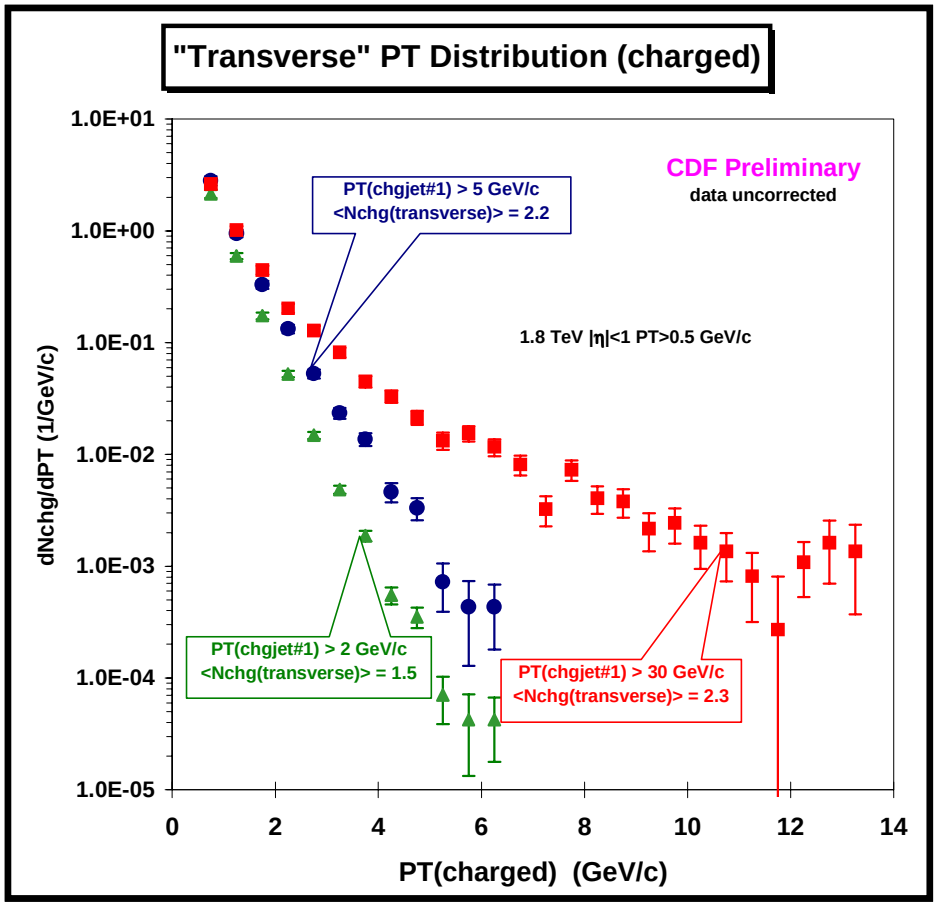


Blessed on 11/3/99

- **Plot shows the "Transverse" <Nchg> versus P_T(chgjet#1) compared to the the QCD hard scattering predictions of Herwig 5.9, Isajet 7.32, and Pythia 6.115 (default parameters with P_T(hard)>3 GeV/c).**
- **Only charged particles with $|\eta| < 1$ and $P_T > 0.5$ GeV are included and the QCD Monte-Carlo predictions have been corrected for efficiency.**

"Transverse" Nchg versus P_T(chgjet#1)

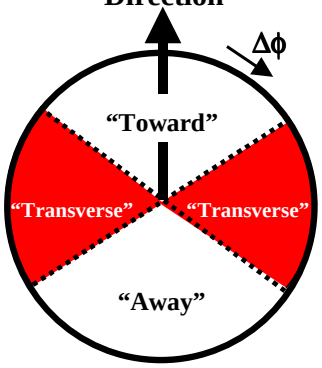


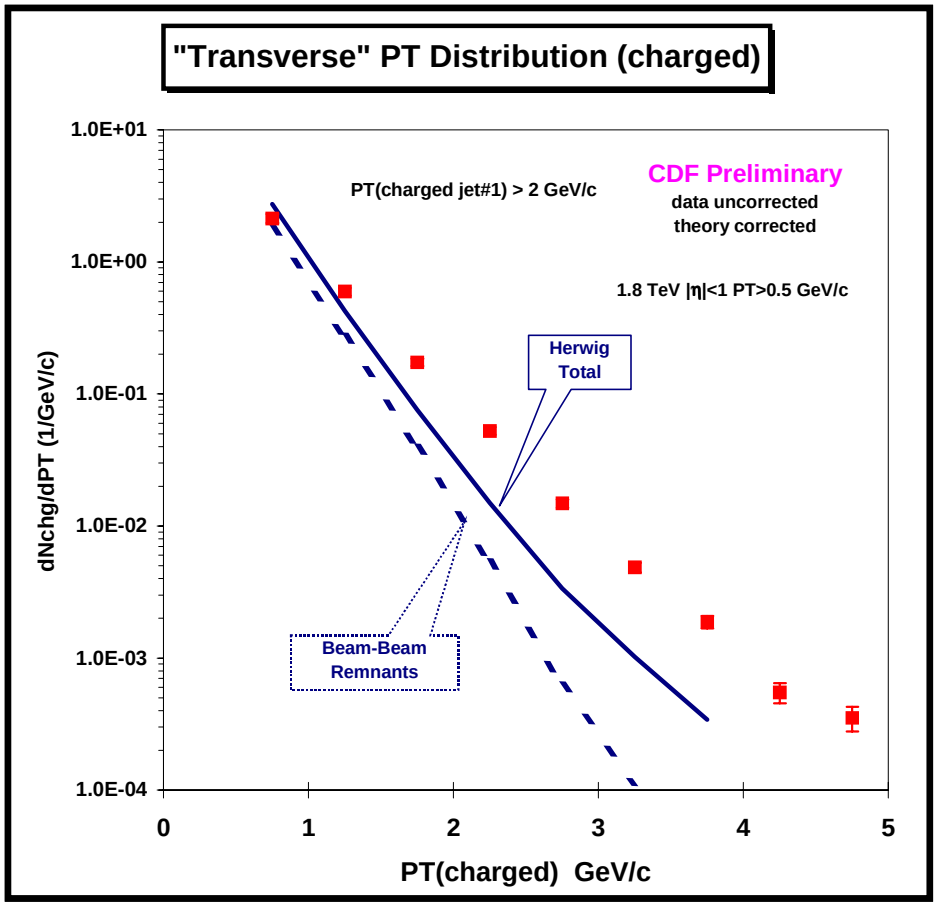


- Plot shows the P_T distribution of the "Transverse" <Nchg>. Each point corresponds to the d<Nchg>/dP_T in a 1 GeV bin.
- The triangle and circle (square) points are the Min-Bias (JET20) data. The errors on the (*uncorrected*) data include both statistical and correlated systematic uncertainties.

To be blessed

"Transverse" Nchg versus P_T(chgjet#1)

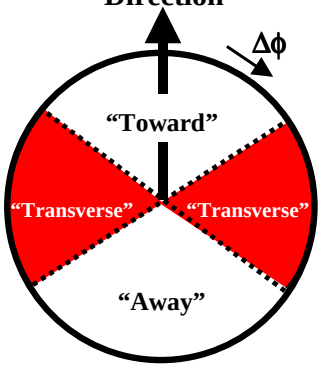


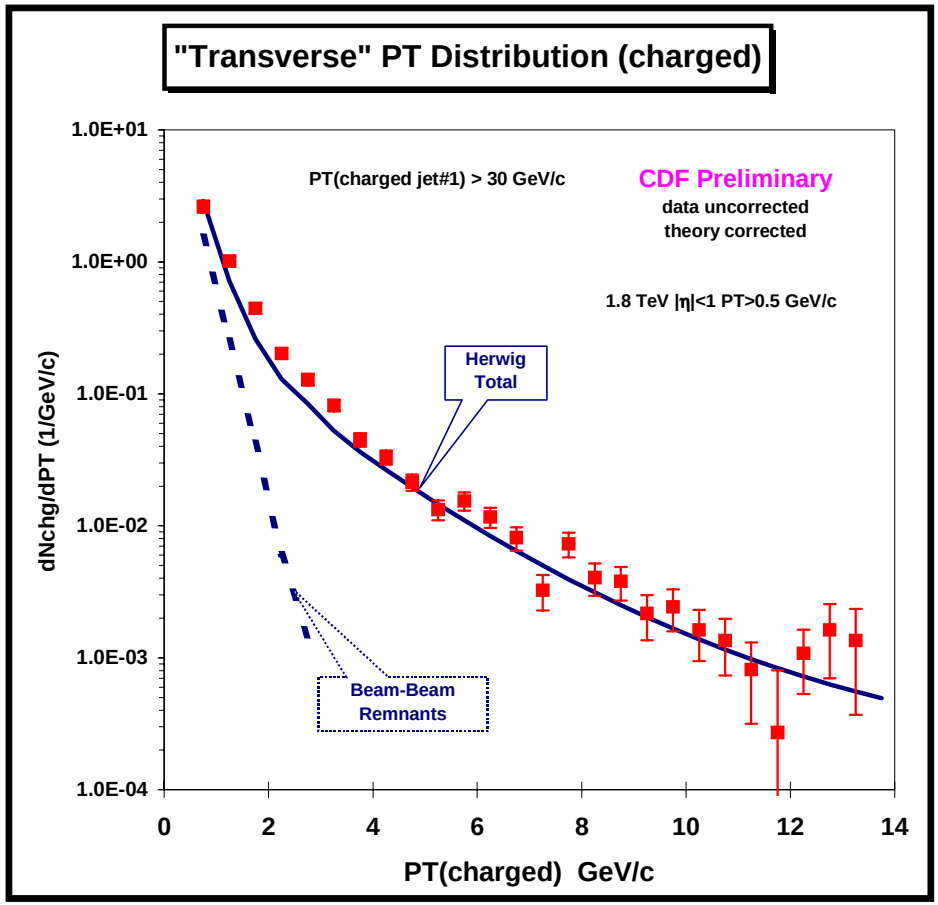


- Plot shows the data on the P_T distribution of the "Transverse" <Nchg> for P_T(chgjet#1) > 2 GeV/c compared with the QCD hard scattering prediction of HERWIG.
- The dashed (solid) curves show the contribution arising from the beam-beam remnants (total).

Theory Curves

"Transverse" Nchg versus P_T(chgjet#1)

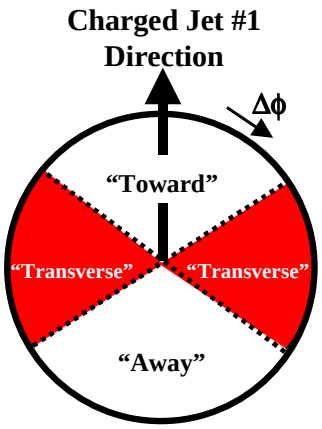


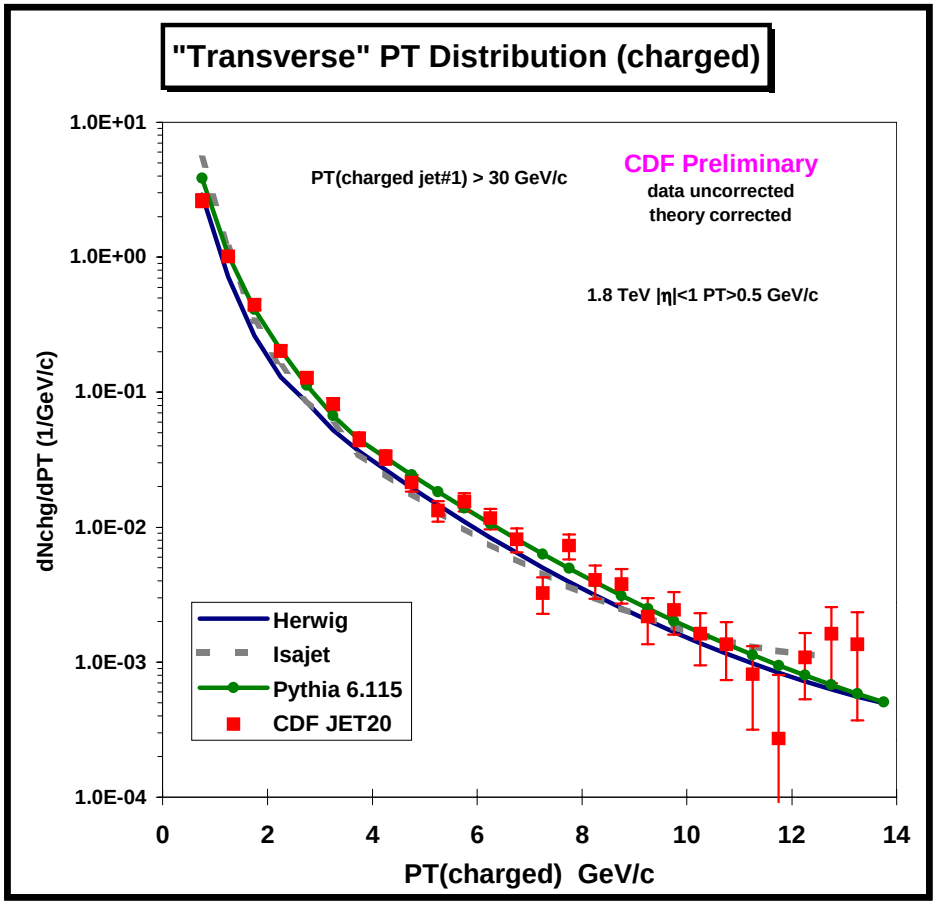


- Plot shows the data on the P_T distribution of the "Transverse" <Nchg> for P_T(chgjet#1) > 30 GeV/c compared with the QCD hard scattering prediction of HERWIG.
- The dashed (solid) curves show the contribution arising from the beam-beam remnants (total).

Theory Curves

"Transverse" Nchg versus P_T(chgjet#1)





- Plot shows the data on the P_T distribution of the "Transverse" <Nchg> for P_T(chgjet#1) > 30 GeV/c compared with the QCD hard scattering prediction of HERWIG, ISAJET, and PYTHIA 6.115.

Theory Curves