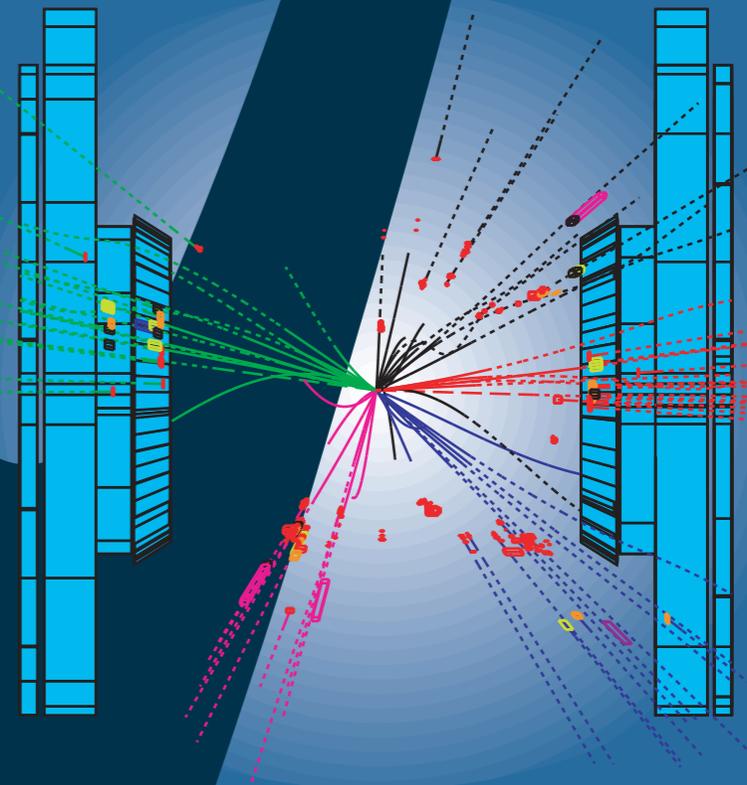
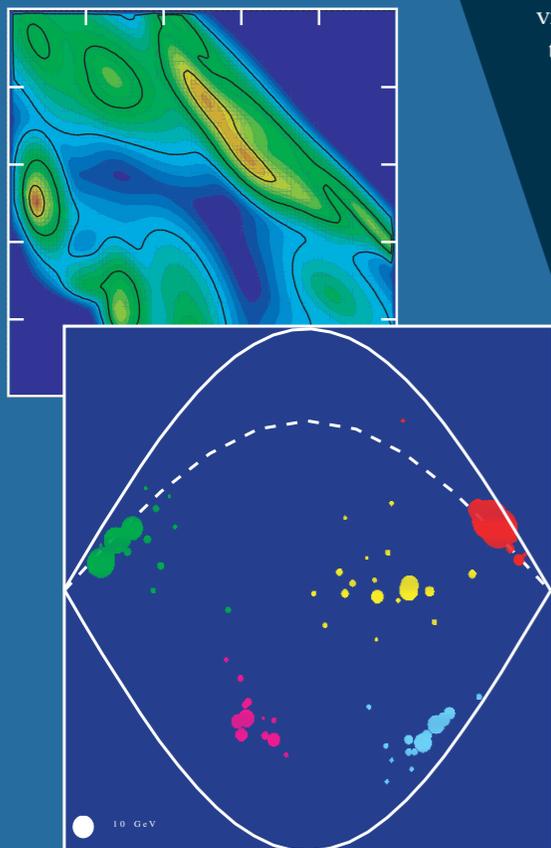
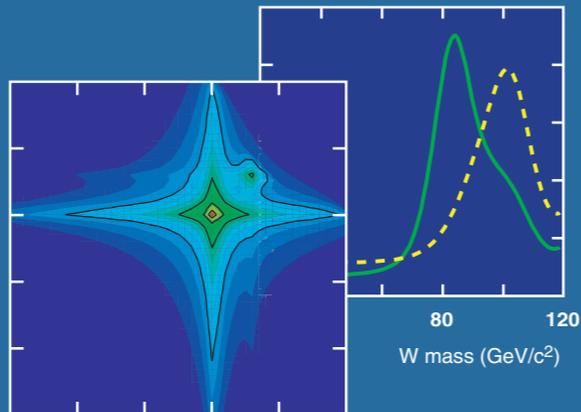


# Direct measurement of the $W$ boson mass in $e^+e^-$ collisions at LEP

Direct measurement of the  $W$  boson mass in  $e^+e^-$  collisions at LEP

Martijn Mulders  2001

The  $W$  boson is one of the heaviest fundamental particles of nature that we know. Since its discovery in 1983 the prediction and measurement of its mass have been main topics in particle physics. Recently the LEP collider at CERN has produced many pairs of  $W$  bosons under controlled conditions. The decay of these short-lived  $W$  bosons gives beautiful events with sometimes 4 or more visible 'jets' of particles in the detector. The analysis to extract the  $W$  mass is a challenge. If both  $W$  bosons in the event decay into 2 jets, which of the 4 jets belongs to which of the  $W$ 's? And what to do when an occasional 5<sup>th</sup> jet pops up? The questions are simple. The answers are not. In this thesis an original approach to the solution is presented, aiming for the best possible resolution on the  $W$  mass and contributing to the most precise  $W$ -mass measurement to date.



Martijn Mulders