

# **The young massive stellar cluster Westerlund 1 in $\gamma$ rays as seen with H.E.S.S.**

**Lars Mohrmann, on behalf of the H.E.S.S. Collaboration**

## **Executive summary**

Westerlund 1 is one of the most massive young stellar clusters in the Milky Way. Massive stellar clusters have been proposed as sources of PeV cosmic rays, this scenario can be tested through  $\gamma$ -ray observations. We present an updated analysis of HESS J1646–458, the  $\gamma$ -ray source possibly associated with Westerlund 1. We employ a new analysis technique – a 3D likelihood analysis – in order to address the challenges posed by a large source extent and the presence of neighbouring sources.

We detect  $\gamma$ -ray emission with a very complex morphology and multiple peaks around, but not at, the position of Westerlund 1. We do not find that the morphology of the emission changes with energy, rather, its energy spectrum is remarkably constant across the source. The combined energy spectrum extends to several tens of TeV, implying – in a hadronic scenario – the acceleration of cosmic-ray protons to several hundreds of TeV.

While two energetic pulsars are present and could be responsible for part of the emission, the properties of the observed  $\gamma$ -ray signal cannot be explained well in a fully leptonic scenario with the pulsars as high-energy electron sources. A hadronic scenario with Westerlund 1 as central source is energetically viable, however, a clear correlation with gas clouds at the currently preferred distance of Westerlund 1 is lacking.