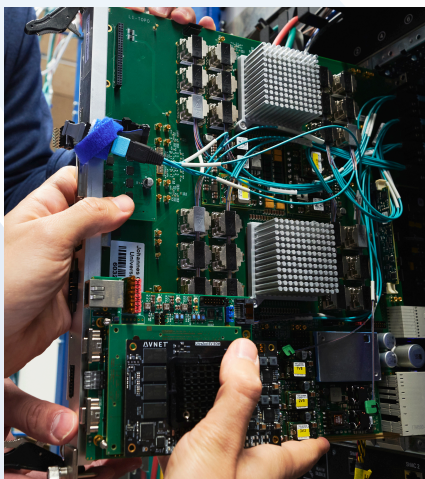


# TRIGGER & DATA ACQUISITION

ATLAS sees up to 1.7 billion collisions every second – but not all of these events are worth studying. The Trigger and Data Acquisition system ensures optimal data-taking conditions and selects the most interesting collision events for study.



The billions of collisions in ATLAS have a combined data volume of more than **60 million megabytes per second** – that's equivalent to 5400 simultaneous streams of 4K video. However, only some of these events will contain interesting characteristics that might lead to new discoveries. To reduce the flow of data to manageable levels, ATLAS uses a special event selection system – the “trigger” – which picks events with distinguishing characteristics for physics analyses.

The ATLAS trigger system carries out the selection process in two stages. The first-level hardware trigger, constructed with custom-made electronics located on the detector, works on a subset of information from the calorimeters and the Muon Spectrometer. The decision to keep the data from an event is made less than **2.5 microseconds** after the event occurs. During this time the event data is kept in storage buffers. If the event is selected it is passed on to the second-level trigger, which can accept up to **100,000 events per second**.

The second-level software trigger operates from a large farm of about **40,000 CPU cores**. In just 200 microseconds, it conducts very detailed analyses of each collision event, examining data from specific detector regions. The second-level trigger finally selects about **1000 events per second** and passes them on to a data storage system for offline analysis.