

Cheuk Lam Chung, “Study and validation of modelling for planned evacuation in Compact Muon Solenoid (CMS)”

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Popular Science Summary

The Compact Muon Solenoid (CMS) detector at CERN is for physics experiment, located approximately 100m underground. Ensuring the safety of personnel within this facility is important. This research aimed to enhance the understanding of evacuation in underground research facilities including CMS cavern.

An unannounced evacuation drill was conducted to simulate an emergency evacuation, involving 48 participants, 10 of them started their evacuation in CMS cavern. Data were collected using questionnaires, observation and video recording. The analysis of this data revealed discrepancies between self-reported behaviours and actual actions taken during the evacuation. One of the findings was that the average pre-evacuation time was 55s.

The study simulated scenarios based on varied behavioural and design factors such as occupant load, distribution and the use of emergency devices. The setting of simulation based on CMS drill data and previous studies, which demonstrated significant variability in evacuation time, with coefficients of variation ranging from 21% to 45%. The adjusted evacuation model was validated from the data collected in the CMS drill.

Additionally, the research evaluated different data collection methods for recording evacuation. The importance of cross-verifying self-reported data with actual observed behaviour was highlighted to ensure data accuracy. Future research could focus on standardizing data collection methods and exploring non-intrusive technologies such as RFID to enhance data accuracy by reducing observer influence.