

# Cross-Task Fine-Tuning for Robust CWE Detection in Python Code Under Adversarial Perturbations

Assignee Research

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## Abstract

This report synthesises findings from 4 peer-reviewed papers addressing the following research question: How does domain adaptation via cross-task fine-tuning affect the robustness of SLMs in detecting CWEs in Python code under adversarial perturbations compared to a baseline of pre-trained LLMs. A joint measurement is presented of the branching fractions  $B^0_s \rightarrow \mu^+ \mu^-$  and  $B^0 \rightarrow \mu^+ \mu^-$  in proton-proton collisions at the LHC by the CMS and LHCb experiments. The data samples were collected in 2011 at a centre-of-mass energy of 7 TeV, and in 2012 at 8 TeV. 6 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 0.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

## 1 Introduction

This paper examines: Observation of the rare  $B^0_s \rightarrow \mu^+ \mu^-$  decay from the combined analysis of CMS and LHCb data. Research question: How does domain adaptation via cross-task fine-tuning affect the robustness of SLMs in detecting CWEs in Python code under adversarial perturbations compared to a baseline of pre-trained LLMs?.

## 2 Methodology

Systematic literature search across multiple databases yielded 4 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 0.3/10.

### 3 Results

4 papers retrieved. 6 claims extracted; 0 independently verified. Quality review score: 0.3/10.

### 4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

### 5 Extracted Claims

Claim	Verified	Confidence
The Large Hadron Collider (LHC) is located approximately 100 m underground near Geneva, Switzerland.	×	0.01
The LHC has a 27 km circular tunnel.	×	0.01
Data for this study was collected at energies of 3.5 TeV per beam in 2011 and 4 TeV per beam in 2012.	×	0.08
The CMS detector is optimized to search for particles with masses ranging from 100 GeV/c <sup>2</sup> to a few TeV/c <sup>2</sup> .	×	0.03
The CMS detector can efficiently detect and study B <sub>0</sub> (5280 MeV/c <sup>2</sup> ) and B <sub>0</sub> s (5367 MeV/c <sup>2</sup> ) mesons decaying to two muons.	×	0.01
The CMS detector employs a 13 m long, 6 m diameter superconducting solenoid magnet operated at a field of 3.8 T.	×	0.01

### References

- <http://arxiv.org/abs/2601.07595v3>
- <http://arxiv.org/abs/1710.05839v2>
- <http://arxiv.org/abs/1411.4413v2>