FedProx Performance Degradation: How Proximal Term Strength (μ) Affects Heterogeneous IDS Training

(A) Performance vs Heterogeneity: FedAvg vs FedProx with Different μ

Legend:
- FedAvg (μ=0)
- FedProx (μ=0.01)
- FedProx (μ=0.05)
- FedProx (μ=0.1)

X-axis: Dirichlet α (Lower = More Heterogeneous)
Y-axis: Final Macro-F1 Score

(B) Relative Degradation vs FedAvg

Legend:
- μ=0.01
- μ=0.05
- μ=0.1
- FedAvg Baseline

X-axis: Dirichlet α
Y-axis: Performance Change (%)

(C) Performance Heatmap: α vs μ

FedProx μ (Proximal Term Strength)	0.05	0.1	0.2	0.5	1.0
0.0	0.498	0.576	0.619	0.635	0.692
0.01	0.479	0.565	0.628	0.661	0.689
0.05	0.379	0.488	0.549	0.539	0.652
0.1	0.334	0.419	0.478	0.552	0.640

X-axis: Dirichlet α (Heterogeneity Level)
Colorbar: Final Macro-F1

(D) Per-α Comparison

Legend:
- α=0.05
- α=0.2
- α=1.0

X-axis: FedProx μ (0.0, 0.01, 0.05, 0.1)
Y-axis: Final Macro-F1

(E) Performance Degradation Heatmap: % Change from FedAvg Baseline

FedProx μ (Proximal Term Strength)	0.05	0.1	0.2	0.5	1.0
0.01	-3.9	-2.0	1.5	4.1	-0.4
0.05	-24.0	-15.3	-11.3	-15.2	-5.7
0.1	-33.0	-27.3	-22.7	-13.1	-7.5

X-axis: Dirichlet α (Heterogeneity Level)
Colorbar: Performance Change (%)