We identify causal variables and their causal graph from temporal sequences with instantaneous effects.

**iCITRIS: Causal Representation Learning for Instantaneous Temporal Effects**

**PROBLEM SETTING**
- Causal effects faster than frame rate cause instantaneous effects
- Joint causal representation learning + causal discovery needed

**OPTIMIZATION STABILIZATION**
- Chicken-and-egg situation: without graph, no disentanglement; without variables, no graph
- Our solution:
  - Graph Learning Scheduling: freeze graph parameters for first several iterations
  - Mutual Information Estimator: no MI between intervened variables and previous time step

**EXPERIMENTS**
- **Instantaneous Temporal Causal3DIdent**: 7 causal variables with temporal and instantaneous effects
- **Causal Pinball**: game dynamics with 5 causal vars

**REFERENCES**