# Efficient verification through approximations

# **Philip Offtermatt**

Based on collaborations with: Michael Blondin, Tim Leys, Christoph Haase Filip Mazowiecki, Guillermo Pérez





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# **Overapproximations help proving safety**





#### Inspiration from pathfinding:



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#### **Business Processes**



#### **Business Processes**



#### **Distributed Systems**



#### **Business Processes**



#### **Distributed Systems**



#### **Program Synthesis**



#### **Business Processes**



#### **Distributed Systems**



#### **Program Synthesis**



#### **Chemical Reactions**



## My work



TACAS '21

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#### TACAS '21

#### Petri net reachability checker



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#### Petri net reachability checker

#### Continuous One-Counter Automata







#### Petri net reachability checker

#### Continuous One-Counter Automata







#### **Current projects**

#### Verifying soundness of workflow nets

#### Petri net reachability checker

#### Continuous One-Counter Automata







#### **Current projects**

# Verifying soundness of workflow nets Approximations for Branching VASS

#### Approximation-guided reachability vs state-of-the-art

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#### Approximation-guided reachability vs state-of-the-art

176 Petri nets Goal: Check safety



#### Approximation-guided reachability delivers promising results!

