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Best Dissertation Award 2026

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Objective:

To recognise emerging Informatics researchers & share excellent research to the IE community and beyond.

2026 Award Committee

- **Ernestina Menasalvas**, Technical University of Madrid, Spain (Chair)
- **Premek Brada**, University of West Bohemia, Czechia
- **Timo Kehrer**, University of Bern, Switzerland
- **Gabriella Pasi**, University of Milano-Bicocca, Italy
- **Heri Ramampiaro**, NTNU, Norway

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About this year's Award

- **29 nominations** received in total.
- Each nomination recognises the best dissertation from a participating institution, defended in **calendar year 2025**;
- All nominees were put forward by **IE member institutions**.
- Each nomination was independently reviewed by two Award Committee members, followed by ranking and a consensus meeting.
- Results: **1 winner, 1 runner-up and 2 distinguished finalists**

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Award Winner receives

- € 3,000 EUR prize
- Sponsorship to attend ECSS 2026
- Award Plaque
- An invitation to publish the dissertation in a **dedicated Springer series**

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Distinguished Finalists

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Distinguished Finalists (listed alphabetically by last name):

- **Joachim Baumann,** Department of Informatics, University of Zurich (CH)

  with dissertation **«On the Societal Impact of Machine Learning»**

- **Thibault Dardinier,** Department of Computer Science, ETH Zurich (CH)

  with dissertation **«Formal Foundations for Automated Deductive Verifiers»**

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Runner-up

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Runner-up

Michal Štefánik

Faculty of Informatics, Masaryk University (CZ)

«Axes of Robustness of Neural Language Models»

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Winner

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Winner

Giuseppe Spallitta

Department of Information Engineering and Computer Science,

University of Trento (IT)

«Efficient and Effective Model Enumeration in SAT and SMT: Investigating Novel Procedures and Applications»

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Efficient and Effective Model Enumeration in SAT and SMT: Investigating Novel Procedures and Applications

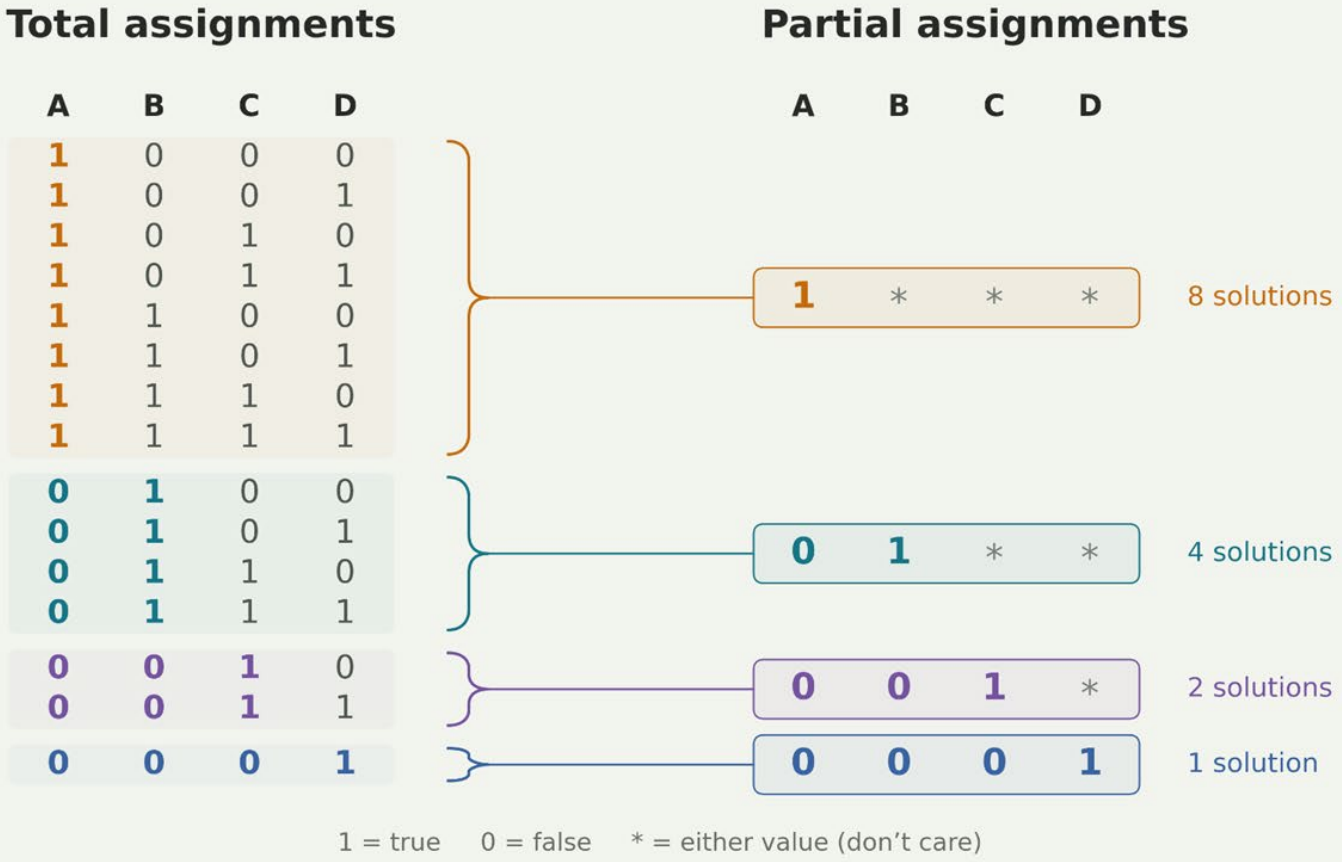
Giuseppe Spallitta

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Model enumeration: why *effective* and *efficient*?

$$\varphi = A \vee B \vee C \vee D$$

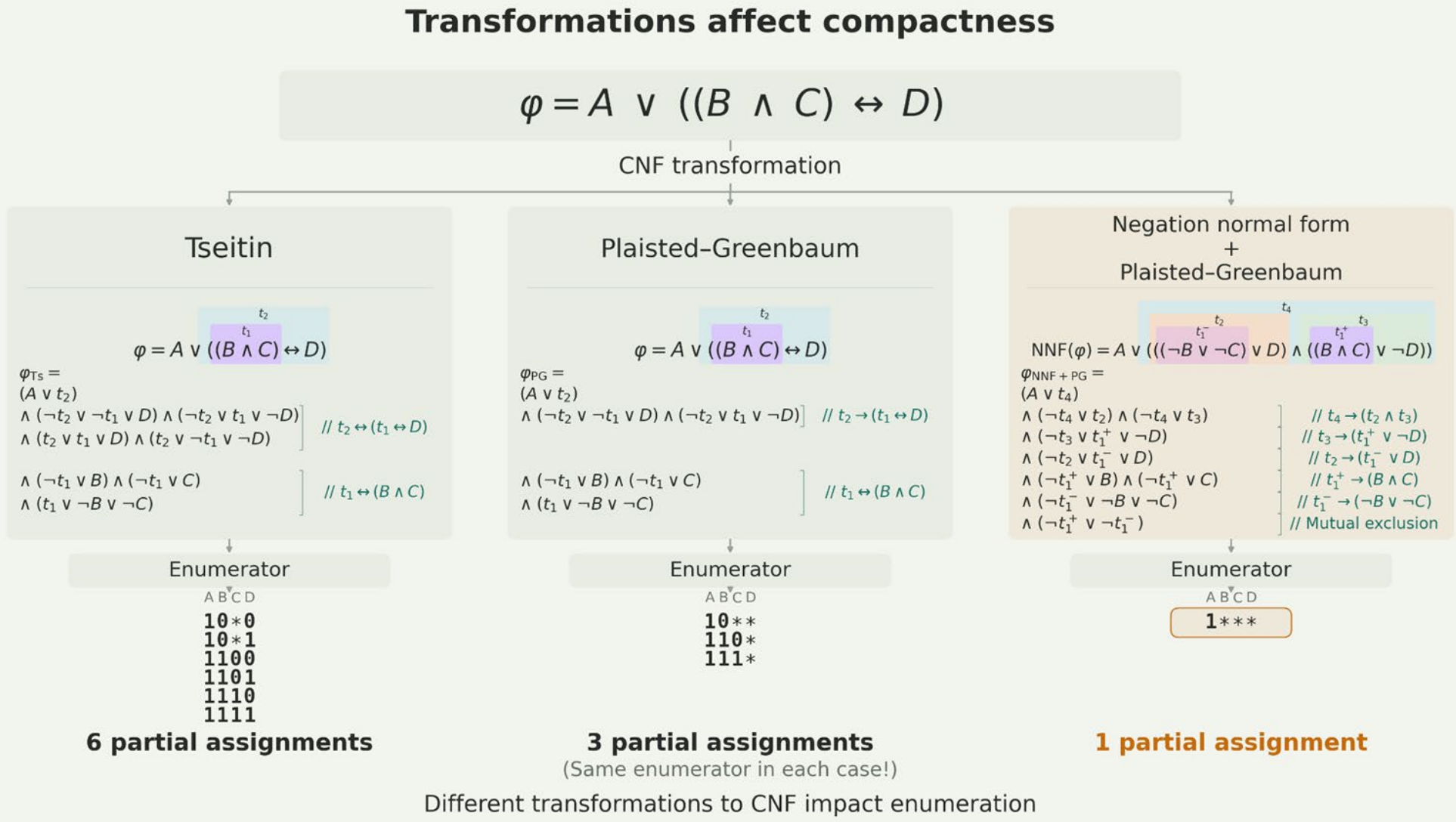


Effective: Cover all solutions with *short* partial assignments, using *as few as possible*.

Efficient: Compute them *quickly*, keeping the overhead of finding short assignments low.

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Algorithmic advances in model enumeration



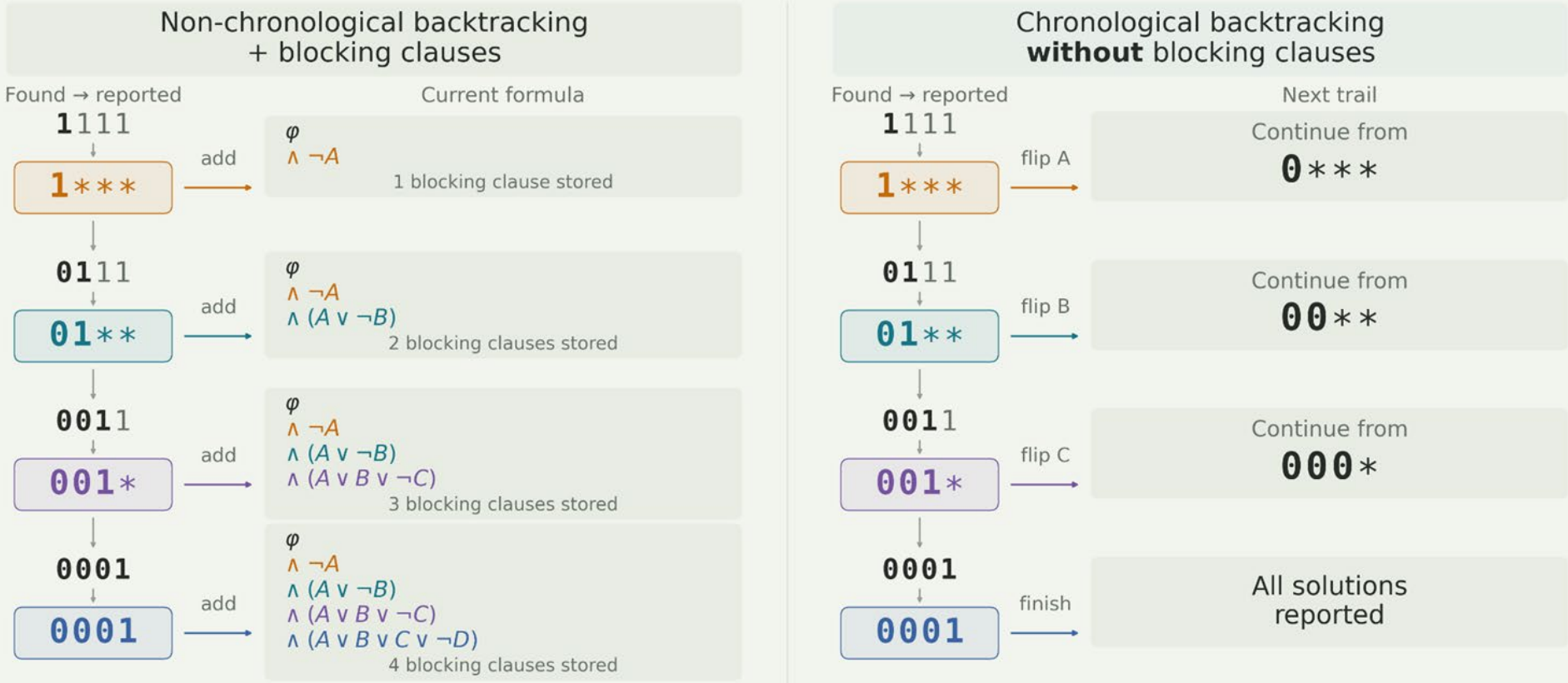
Masina, Spallitta & Sebastiani · **International Conference on Theory and Applications of Satisfiability Testing (2023); Journal of Artificial Intelligence Research (2025)**

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Algorithmic advances in model enumeration

Disjoint enumeration without blocking clauses

$$\varphi = A \vee B \vee C \vee D$$



Blocking clauses accumulate

No blocking clauses stored

We can enumerate without generating blocking clauses

⇒ avoid exponential blowup in memory and drastically reduce CPU time

Spallitta, Sebastiani & Biere · **AAAI Conference on Artificial Intelligence (2024); Artificial Intelligence (2025)**.

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Novel applications of model enumeration

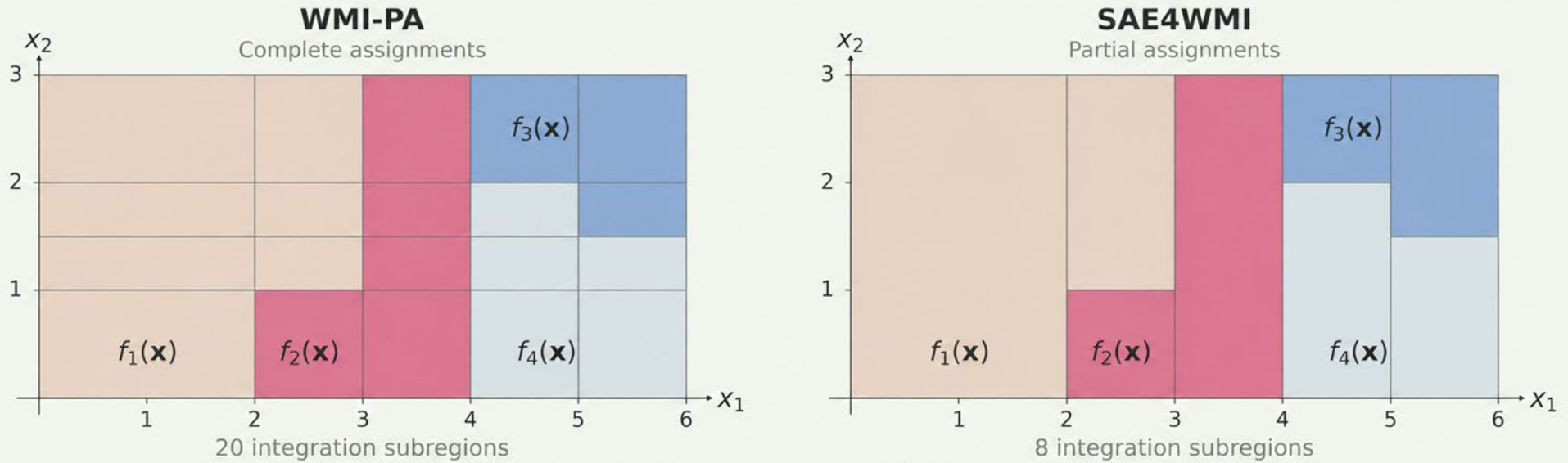
Weighted Model Integration

$$\chi = (x_1 \geq 0) \wedge (x_1 \leq 6) \wedge (x_2 \geq 0) \wedge (x_2 \leq 3)$$

$w(\mathbf{x})$ = If $(x_1 \leq 4)$ Then
(If $(x_1 \leq 2) \vee ((x_1 \leq 3) \wedge (x_2 > 1))$ Then $f_1(\mathbf{x})$ Else $f_2(\mathbf{x})$) Else
(If $(x_2 > 2) \vee ((x_1 > 5) \wedge (x_2 > \frac{3}{2}))$ Then $f_3(\mathbf{x})$ Else $f_4(\mathbf{x})$)

$$\mathrm{WMI}(\varphi, w) = \sum_{\mathbf{a} \in \{0,1\}^m} \int_{\varphi(\mathbf{x}, \mathbf{a})} w(\mathbf{x}, \mathbf{a})\, d\mathbf{x}$$

SMT enumeration identifies regions under the same weight function value



Enumeration should follow the **weight structure** to avoid unnecessary integration subregions.

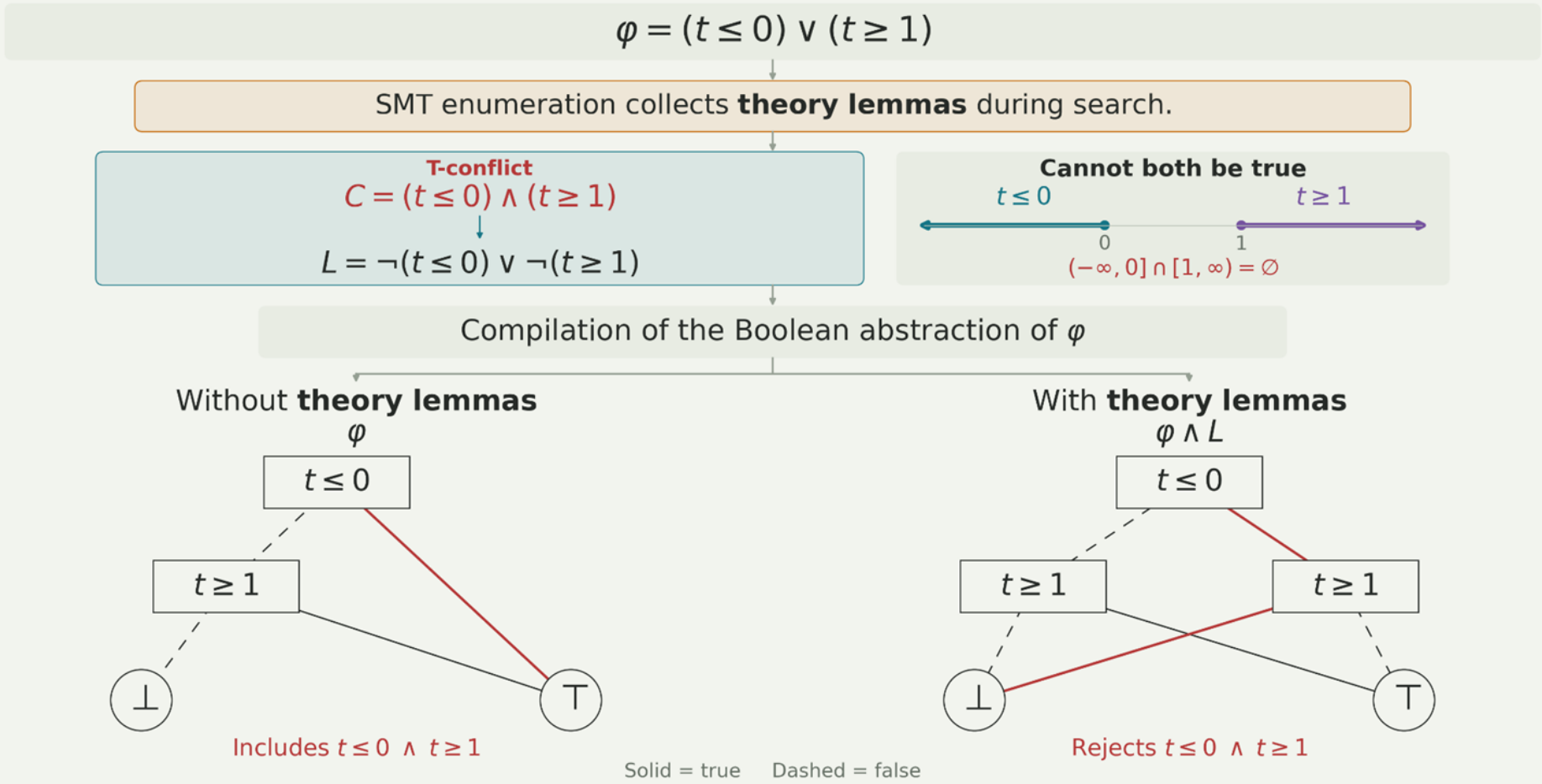
⇒ makes probabilistic reasoning via WMI much faster

Spallitta, Masina, Morettin, Passerini & Sebastiani · **Conference on Uncertainty in Artificial Intelligence (2022); Artificial Intelligence (2024)**

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Novel applications of model enumeration

Knowledge compilation modulo theories



We can use a Boolean compiler as a **black box** to build a theory-agnostic SMT knowledge compiler.

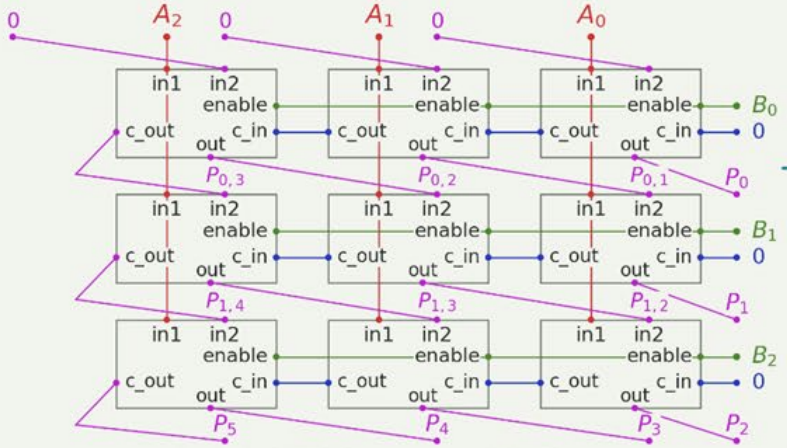
⇒ Makes Knowledge Compilation much more expressive and applicable to general domains.

Michelutti, Masina, Spallitta & Sebastiani · **European Conference on Artificial Intelligence (2024)**.

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Formal Reasoning in the Quantum Era

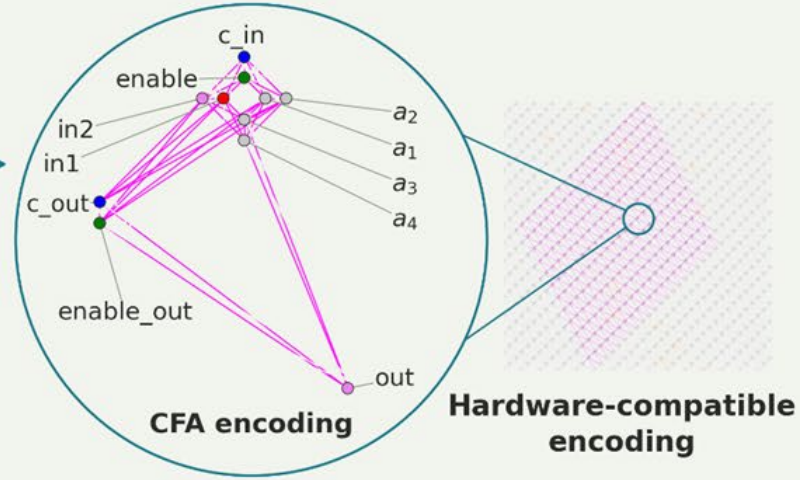
Prime factorization via Quantum Annealing



3 × 3-bit binary multiplier

SMT / OMT

Synthesize compact encodings under hardware constraints



$$8\,219\,999 = 32\,749 \times 251$$

Biggest coprime ever factorized by a pure quantum device.

Future research

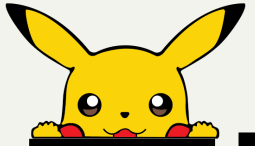
Use SAT/SMT to fully model, verify and control novel quantum technologies

Formal Reasoning ⟷ **Emerging Quantum Computing**

Exploit quantum effects of novel technologies to target difficult classical problems

Ding, Spallitta & Sebastiani **Scientific Reports (2024); Frontiers in Computer Science (2024)**.

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Thanks for listening!