DIALECTICA PETRI NETS

Elena Di Lavore
Tallinn University of Technology

Wilmer Leal
Max Planck Institute for Mathematics in the Sciences

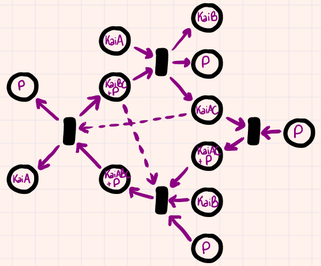
Valeria de Paiva
Topos Institute

GOAL

Composing Petri nets and closing them under linear logic connectives

KLEENE DIALECTICA

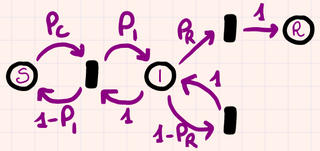
$L = \{-1, 0, 1\}$



Chemical reaction network regulating the circadian clock of Synechococcus Elongatus

PROBABILISTIC DIALECTICA

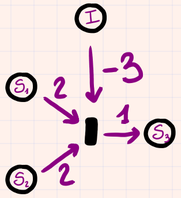
$L = [0, 1]$



Petri net representing the SIR model for infectious diseases

INTEGERS DIALECTICA

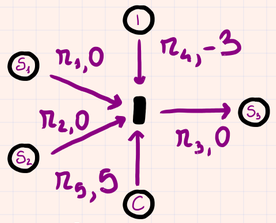
$L = \mathbb{Z}$



Chemical reaction network with inhibitor arc

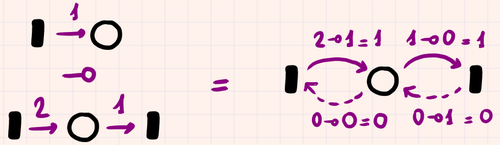
PRODUCT OF LINEALES

$(L = \mathbb{R}^+ \times \mathbb{Z})$

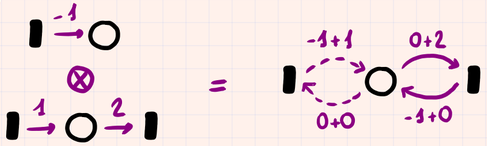


Chemical reaction network specifying the rates, with inhibitor and catalyst

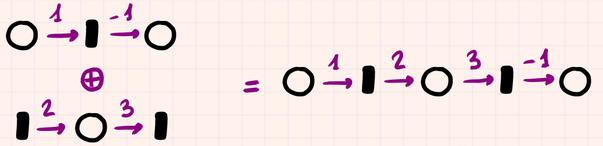
INTERNAL HOM



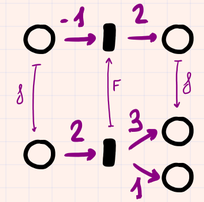
TENSOR



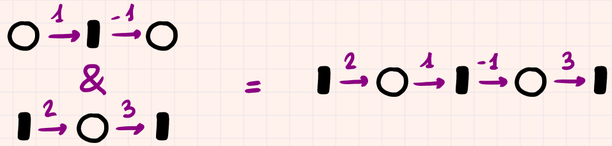
COPRODUCT



MORPHISMS



PRODUCT



FUTURE WORK

- Notions of behaviour of Petri nets
- Differential linear logic Petri nets
- Implementations

MAIN REFERENCES

- E. Di Lavore, W. Leal, V. de Paiva
  Dialectica Petri nets
  arXiv preprint arXiv:2105.12801
- C. Braun, D. Ghica
  A categorical linear framework for Petri Nets
  LiCS 1990
- V. de Paiva
  Categorical multirelations, linear logic and Petri nets
  Technical report 1991