

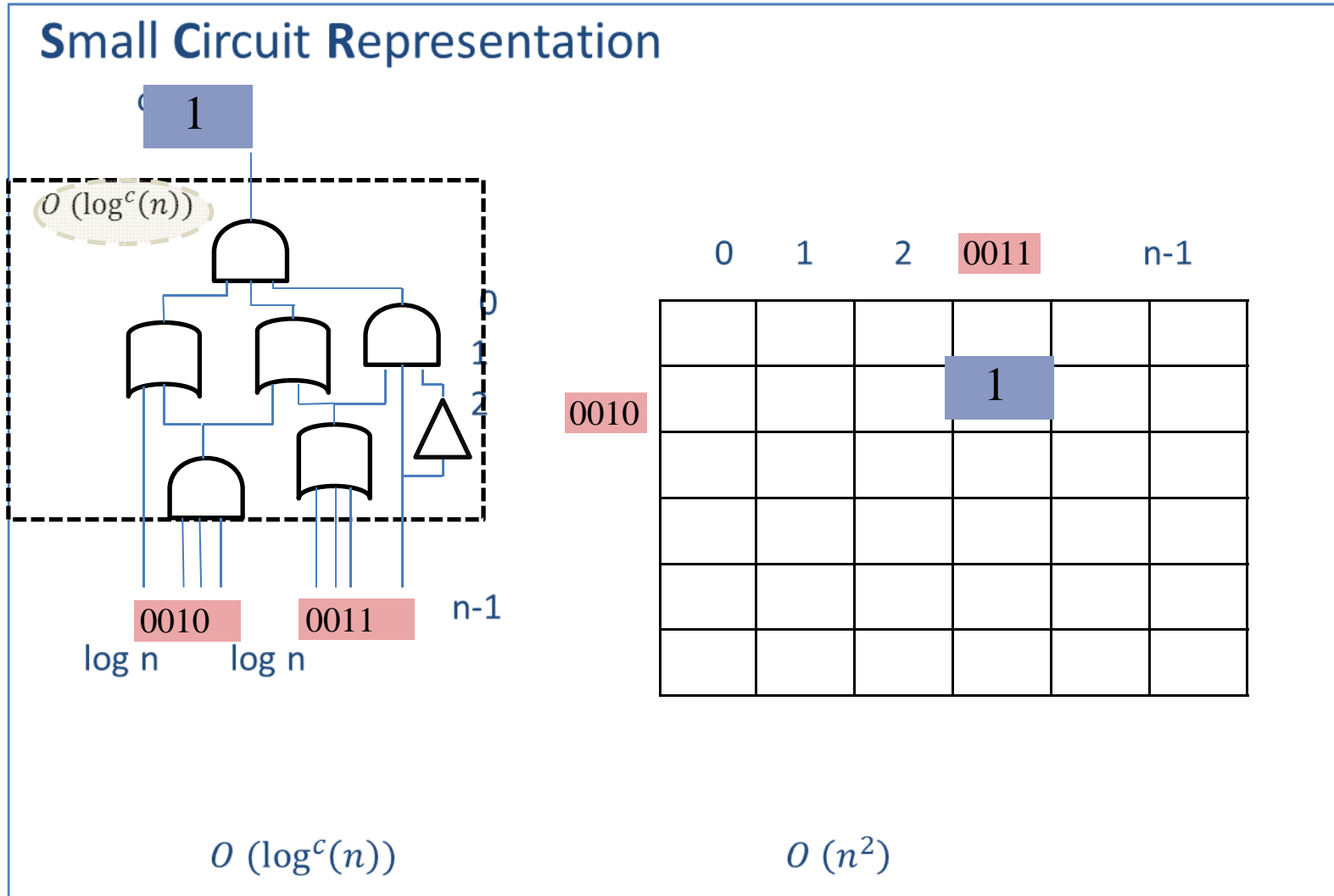
Holographic Computation of Exponential Hard Problems

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Succinct representation of Graphs [GW83]



Succinct Permanent

Permanent [Lipton]

#P - Complete

Hard on Average as on the Worst Case

Succinct Permanent [PY86]

Nexp - Complete

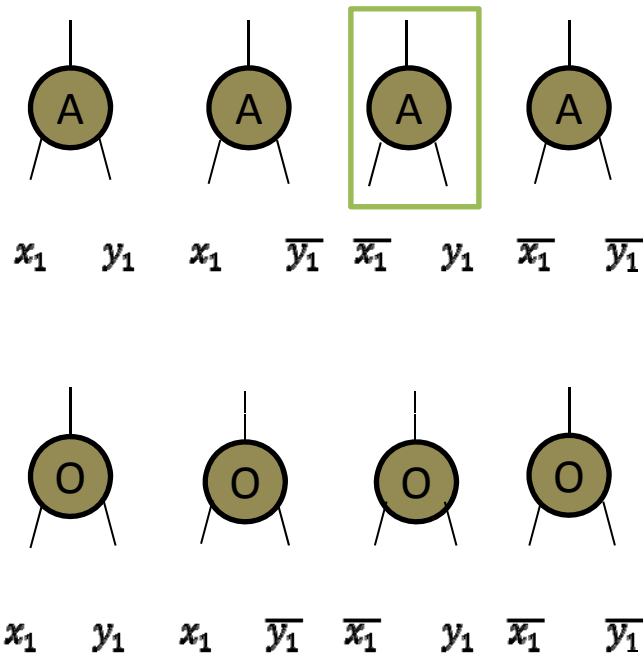
Conjecture: Hard on Average as on the Worst Case

Goal:

Optical Device Solving Succinct
Permanent in polynomial time...

Preprocessing Procedure

BC_1 - all 1 leveled circuits



G_1 - General Matrix

0	0	0	1	0	1	1	1
0	0	1	0	1	0	1	1
0	1	0	0	1	1	0	1
1	0	0	0	1	1	1	0

A vertical dashed line is positioned between the 4th and 5th columns of the matrix. A green box highlights the 3rd column of the matrix.

Preprocessing Procedure

Preprocessing: $G_1 \rightarrow G_2 \rightarrow \dots \rightarrow G_n$

Algorithm: $G_i \rightarrow G_{i+1}$

$$G_{i+1} = L \cdot R$$

0	0	0	1	0	1	1	1
0	0	1	0	1	0	1	1
0	1	0	0	1	1	0	1
1	0	0	0	1	1	1	0

00...0 00...0 00...0	00...0 00...0 00...0	00...0 00...0 00...0	GI	00...0 00...0 00...0	GI	GI	GI
00...0 00...0 00...0	00...0 00...0 00...0	GI	00...0 00...0 00...0	GI	00...0 00...0 00...0	GI	GI
00...0 00...0 00...0	GI	00...0 00...0 00...0	00...0 00...0 00...0	GI	GI	00...0 00...0 00...0	GI
GI	00...0 00...0 00...0	00...0 00...0 00...0	00...0 00...0 00...0	GI	GI	GI	00...0 00...0 00...0

Preprocessing Procedure

00...0 00...0	00...0 00...0	00...0 00...0	G1	00...0 00...0 00...0	G1	G1	G1
00...0 00...0	00...0 00...0	G1	00...0 00...0 00...0	G1	00...0 00...0 00...0	G1	G1
00...0 00...0 00...0	G1	00...0 00...0 00...0	00...0 00...0 00...0	G1	G1	00...0 00...0 00...0	G1
G1	00...0 00...0 00...0	00...0 00...0 00...0	00...0 00...0 00...0	G1	G1	G1	00...0 00...0 00...0

G1	G1	G1	11...1 11...1 11...1	G1	11...1 11...1 11...1	11...1 11...1 11...1	11...1 11...1 11...1
G1	G1	11...1 11...1 11...1	G1	11...1 11...1 11...1	G1	11...1 11...1 11...1	11...1 11...1 11...1
G1	11...1 11...1 11...1	G1	G1	11...1 11...1 11...1	11...1 11...1 11...1	G1	11...1 11...1 11...1
11...1 11...1 11...1	G1	G1	G1	11...1 11...1 11...1	11...1 11...1 11...1	11...1 11...1 11...1	G1

Conclusions

- Optical device for solving NEXP-Complete Problem
 - in polynomial time of the input
 - with preprocessing and
 - large space
- Cryptographic system applications

