



The Natural Laws of Extreme Universe

Second Annual Meeting

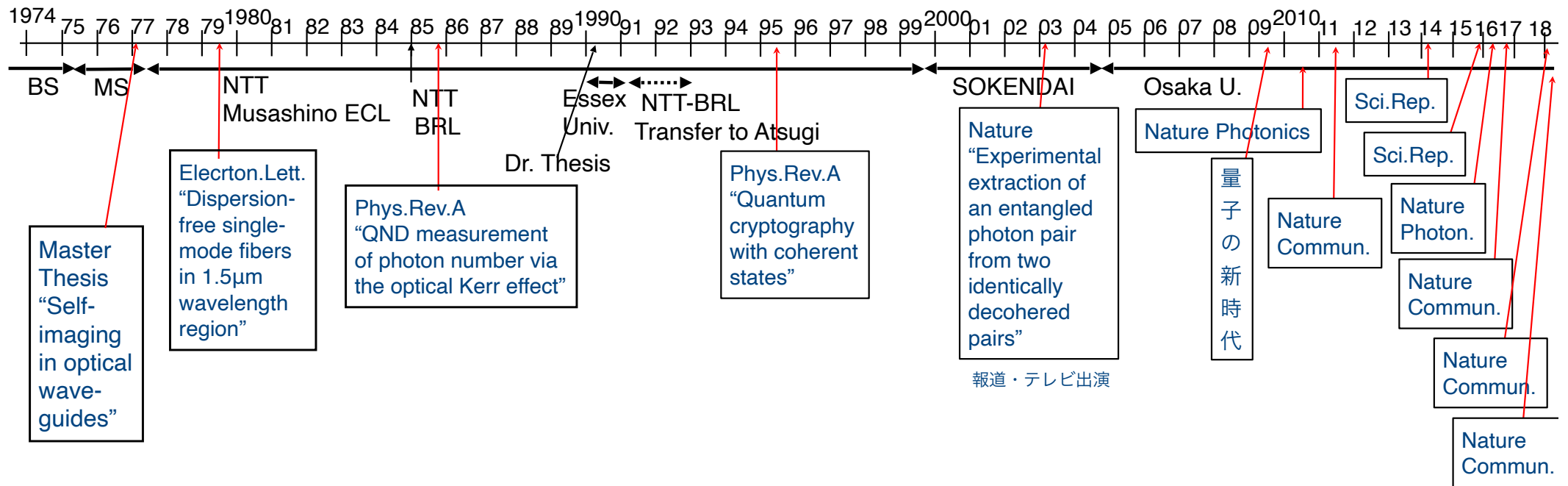
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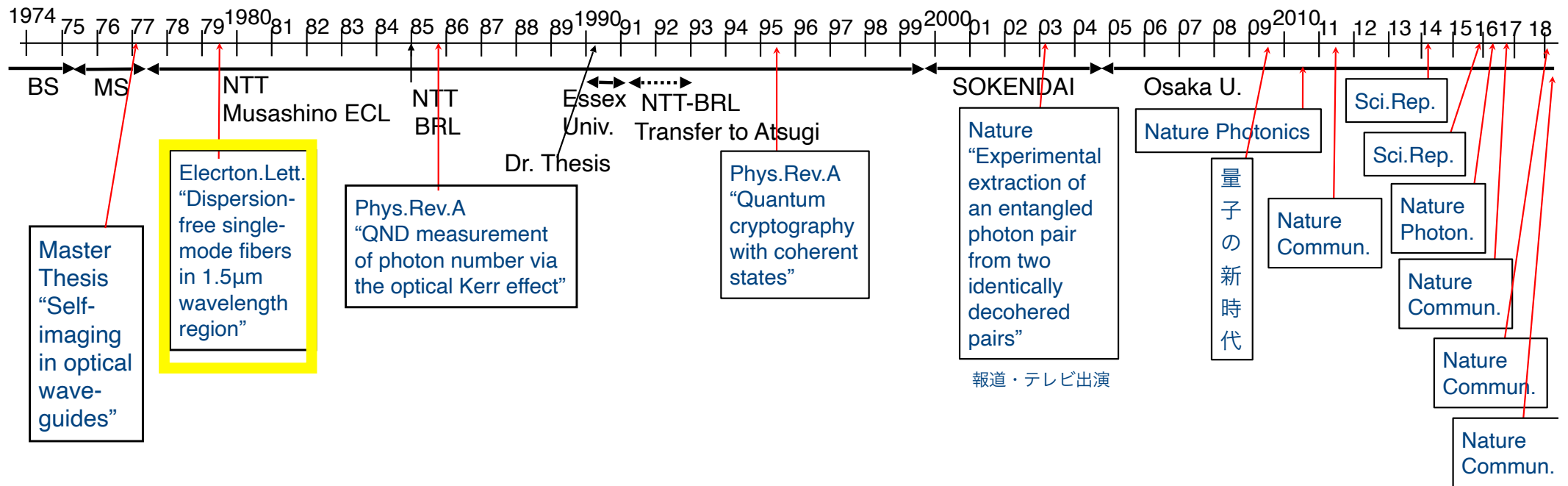
Kobe Convention Center, International Conference Center, Room 301

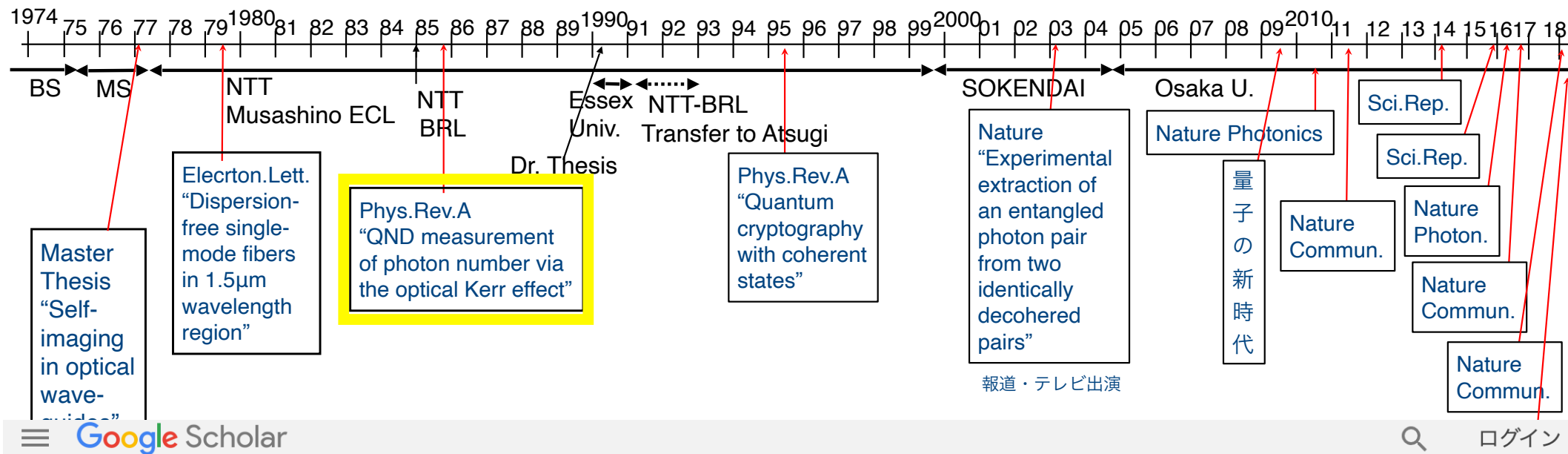
Some unanswered questions

University of Tokyo

Nobuyuki IMOTO







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[quantum computer](#) [quantum communication](#)



[自分のプロフィールを作成](#)

タイトル

引用先 年

Quantum entanglement for secret sharing and secret splitting

A Karlsson, M Koashi, N Imoto
Physical Review A 59 (1), 162

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B Huttner, N Imoto, N Gisin, T Mor
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Quantum nondemolition measurement of the photon number via the optical Kerr effect

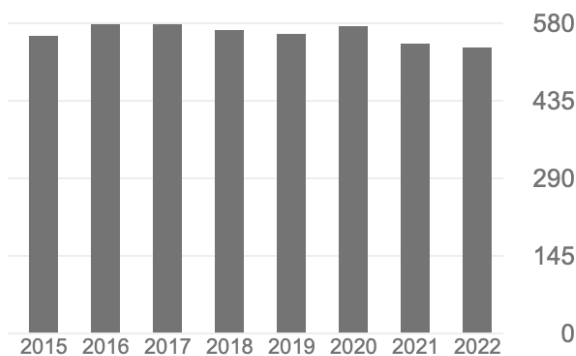
N Imoto, HA Haus, Y Yamamoto
Physical Review A 32 (4), 2287

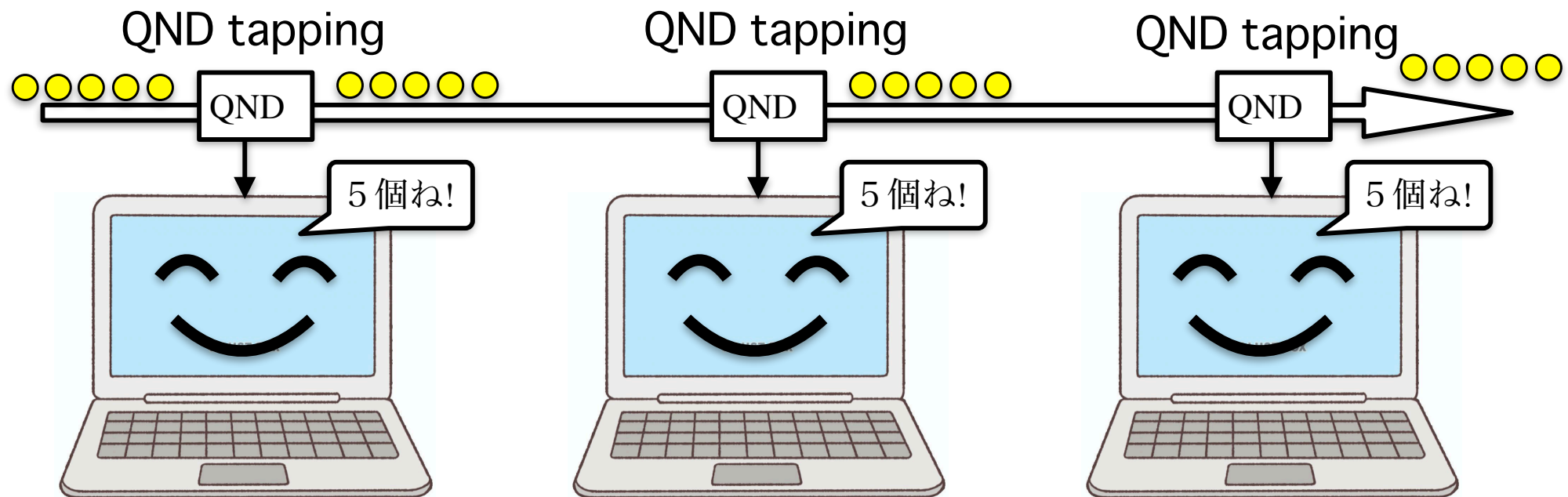
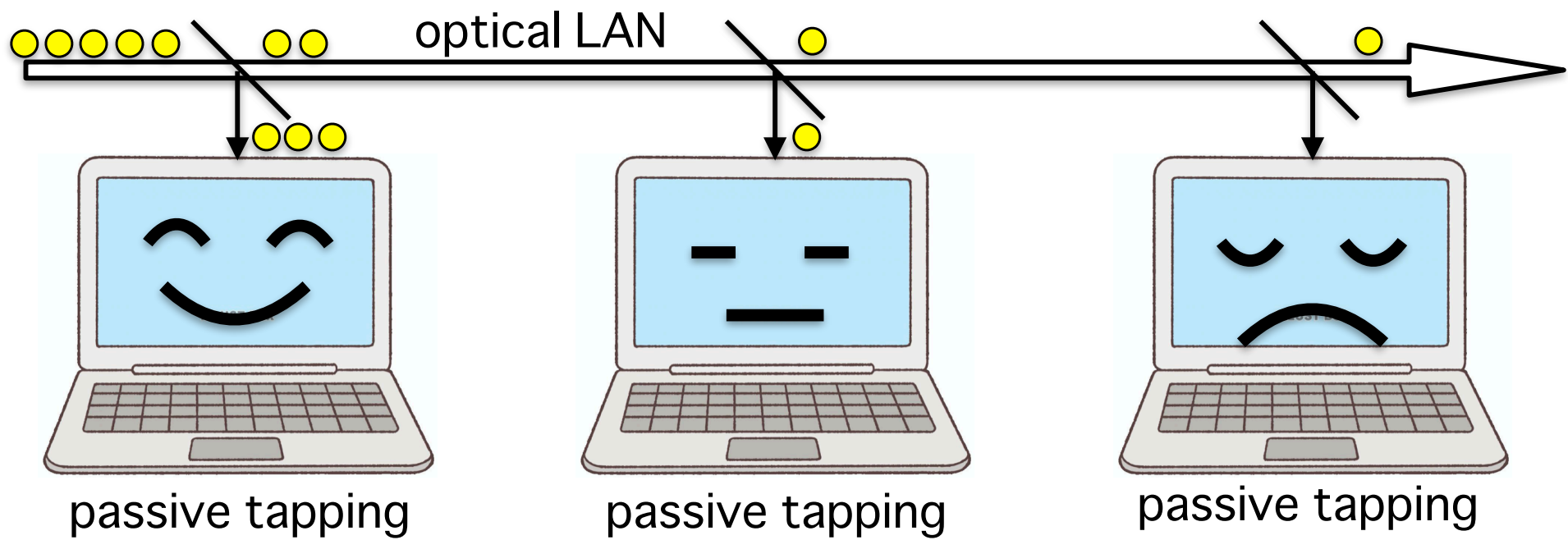
740 1985

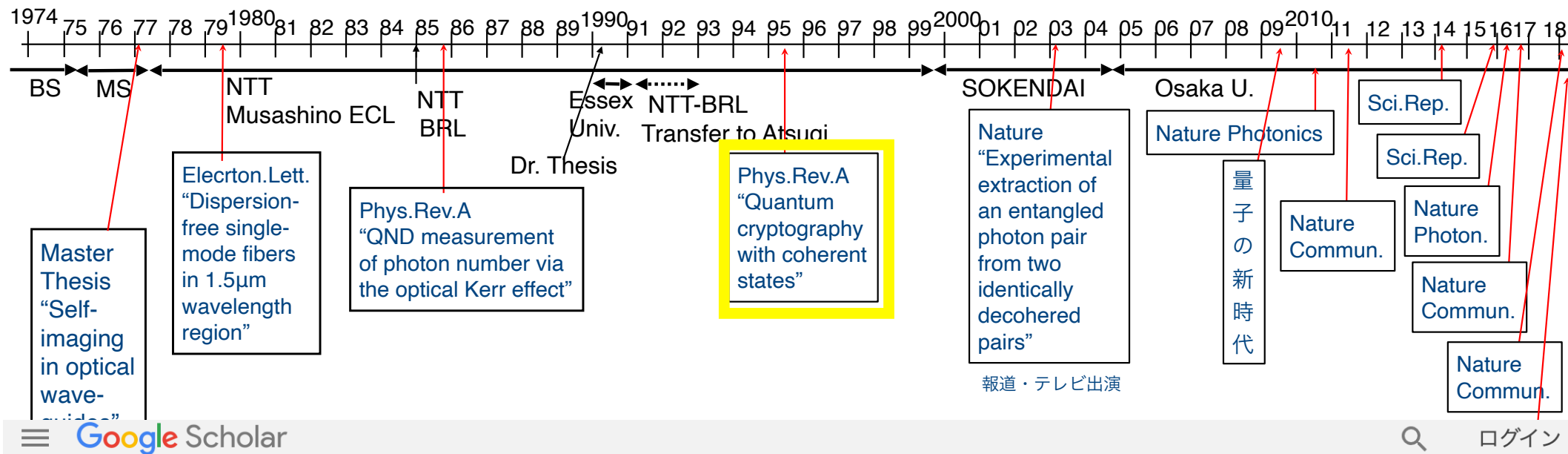
引用先

[すべて表示](#)

	すべて	2017 年以来
引用	10846	3361
h 指標	53	31
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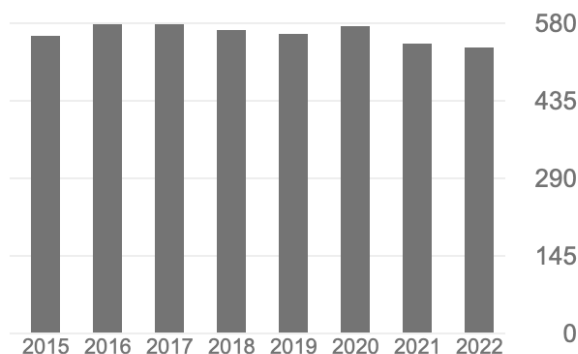


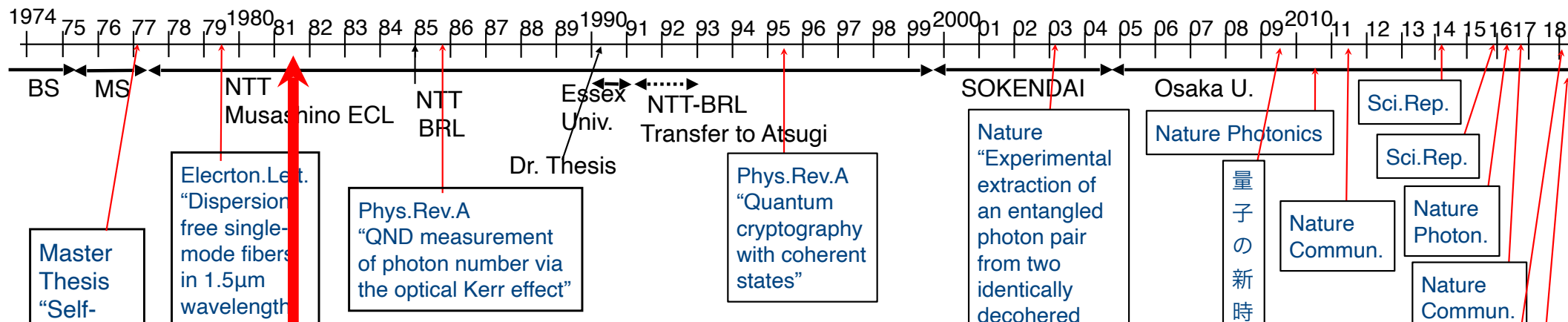
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Selected works from
the 3rd Hoshi Shinichi
Short-Short Contest
(1981)



まえがき I 星新一

幸せ色の空	9	大懸朋雪	新説・キツネとブドウ	73	四国三郎
アンテナ	16	鈴木広	禍転じて――	79	上村博
大きなーれ	18	日向紀生	魔法の薬	86	大島輝則
マクラ	22	藤田一郎	指	92	森本良徳
午前一時のフーガ	26	松林由美	落ちた男	98	松田並子
コンピューター・エイジ	28	阿部敦良	クリムゾン色の夢	103	鈴木仁
星	34	江頭弘	紫陽花	105	小原良
ドッカーン	38	金子智恵子	端午の幟	111	風間齊
愚か者の願い	42	五十嵐裕一郎	パースト・ウインド	115	清水伸之
遊ぶのが下手な男	49	三沢まどか	スーパーマンの証明	121	島村寛
入ってますよ	54	光実幸典	わんこそば	127	尾瀬慎六
前足をなくした犬の話	62	清水直	手袋	134	西川徹
鞆の中の海	64	相沢正一郎	ある日	138	上村光治
エイリアン	67	井元信之	おぼけ	139	鈴木恵美

選挙運動	145	寺松英世	めし	206	塩崎俊子
送られた男	151	大日方洋一	声	210	美藤幸江
赤いバラととまった時間	153	芦野かおり	白いテニスウエア	215	小田ゆかり
あるパラドックス	157	小林聡幸	日本人総かぐや姫	219	山本幸久
読むな	163	青木隆弘	首	224	紋天沖世
ベッド	166	坂口智之	魔法の言葉	231	小林千晃
空の旅	171	飛魚隆一	危険がいっぱい	234	武野弘
植猫鉢	175	高澤紀彦	苦心談	239	千葉速人
大発明による人類黄金期の到来	179	池田安孝	ホームシック・ホームシック	242	岩間宏通
雨美濃	183	K・ヒロシ	懷疑論者	248	古井新吉
説得	188	平井幸司	ふらすちつく・いれいさあ	249	竹政美恵子
少年老い易く……	193	前田善弘	帰郷	254	太田忠司
最後の神だのみ	198	橘和彦	金のなる木	258	吉永等
透明人間	203	西城伸子	あとがき	262	星新一

Outline of “Alien”

The missing black hole exploration ship HORN has finally returned. However, people on Earth were surprised and puzzled by observing that right and left have been interchanged for everything in the returned ship. The heart moved to one's right chest for all of the crew members, and the chirality of screws and coils became opposite. Looking at the letters

"ИЯОН"

on the outside wall of HORN, some people thought a USSR ship had tried to invade.

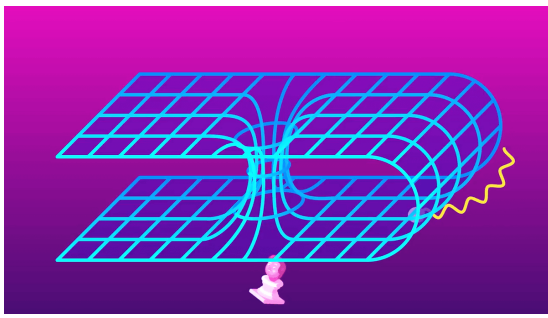
A long meeting was set to discuss what happened actually. When Michel, the sharpest of the young crew, deduced that the HORN must have passed through a localized Klein bottle, everyone agreed and praised him.

After the long meeting, Michel met his fiancée Martha, who was waiting for him to return. Michel and Martha decided to be married soon.

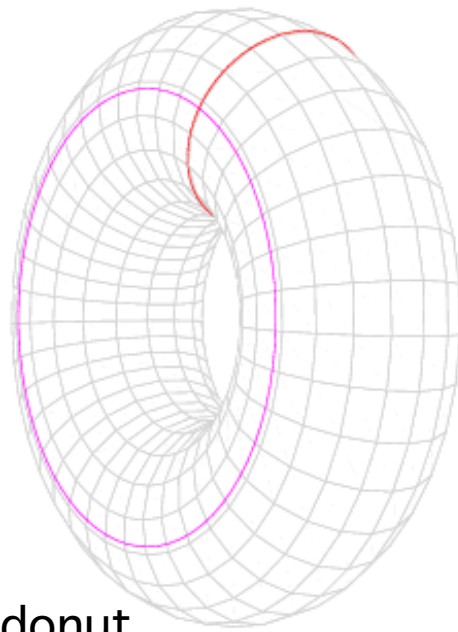
The next day, however, Michel was called by his Boss and the Boss told him to "go through the Klein bottle again!

“What? What are you saying!” shouted Michel. Then the Boss started to explain.

“You know that the DNA of all living creatures on Earth is a double helix wound in the same orientation. Now, you are an alien whose DNA has the opposite chirality. Therefore, you cannot marry or procreate unless you go through there again.”



wormhole



donut
(global)



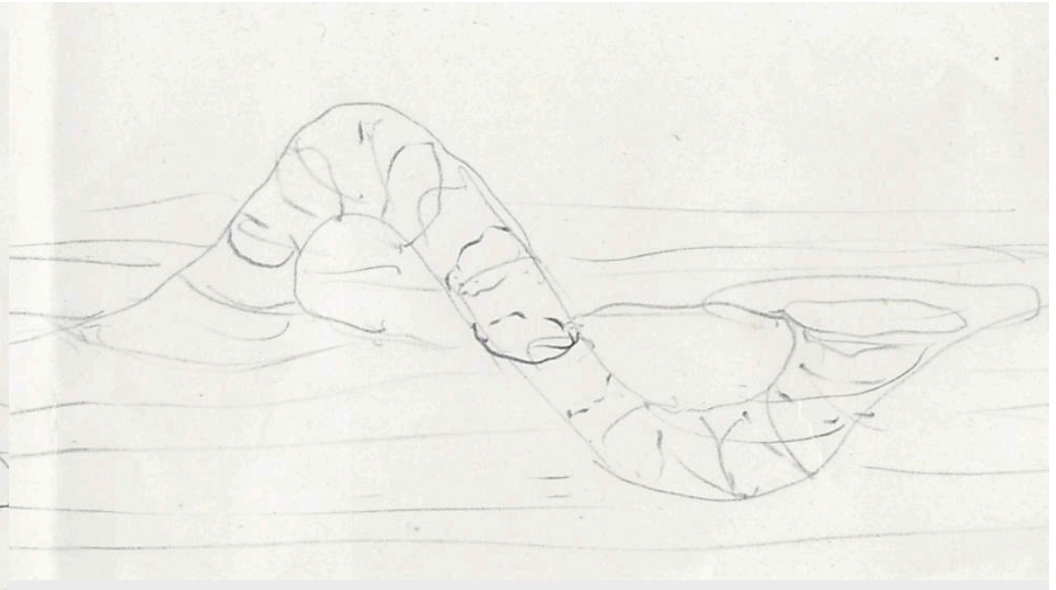
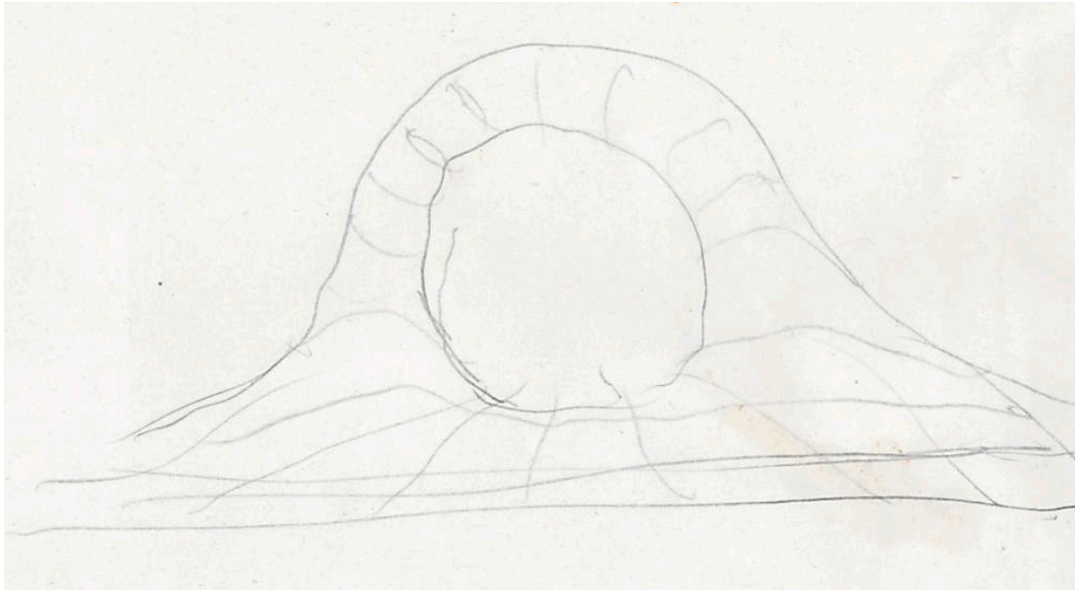
global Klein bottle



wormhole (local)



local Klein bottle



Possible discussions:

If parity can be inverted, it is inconsistent with non-preservation of parity.

According to the CPT preservation, it is OK if C xor T is also inverted.

But isn't it dangerous to shake hands with someone who has become anti-matter?

It is also difficult to imagine someone acting in reverse chronological order.

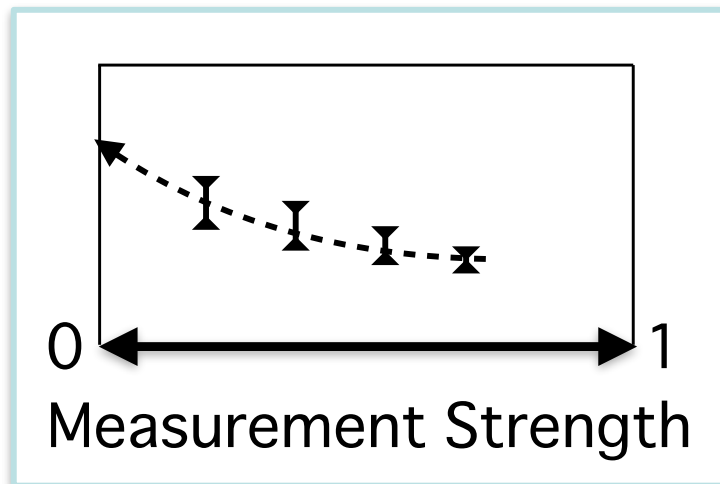
I probably need to study more about the stability of wormholes.

Let's return to the main subject: questions to be answered in near future

① Directions of treating quantum errors

- Error mitigation (Extrapolate type)

To obtain a weak value



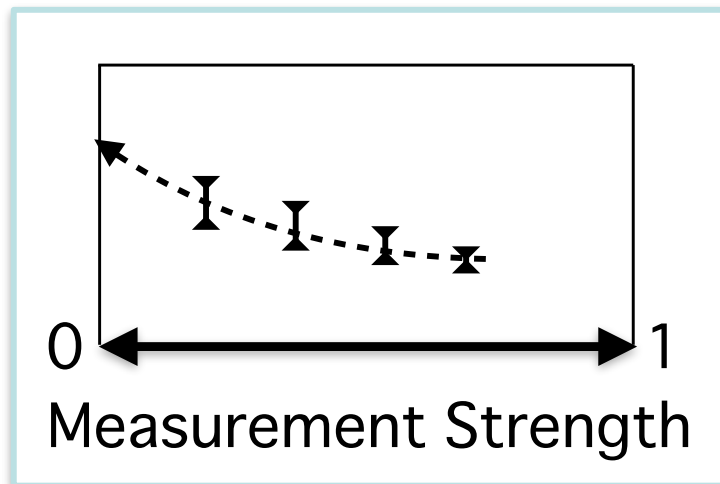
Since it takes too much time as you make the measurement too weak, you stop and extrapolate.

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① Directions of treating quantum errors

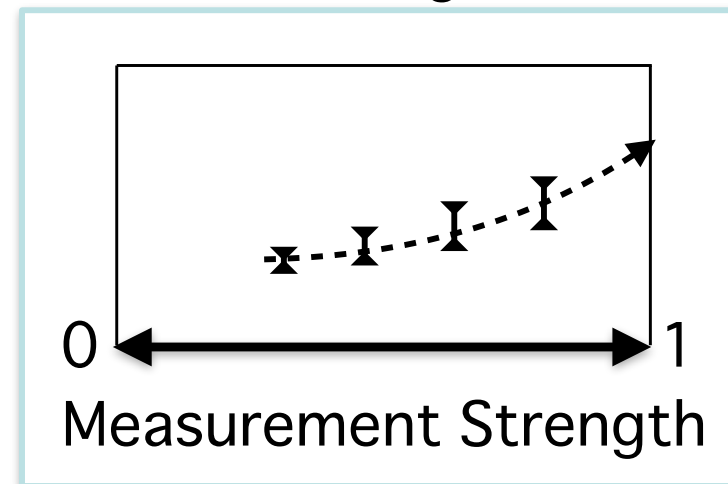
- Error mitigation (Extrapolate type)

To obtain a weak value



Since it takes too much time as you make the measurement too weak, you stop and extrapolate.

Error mitigation



Since noiseless measurement is not available now, you put additional noise and decrease, and extrapolate.

Let's return to the main subject: questions to be answered in near future

① Directions of treating quantum errors

- Error mitigation (Extrapolate type)
- QEC (Quantum Error Correction)
- FTC (Fault Tollerant quantum Computation)
- Measurement Induced Computation
(Cluster state preparation and measure qubits one-by-one)
Question: How high-fidelity is necessary for the cluster state?

Let's return to the main subject: questions to be answered in near future

- ① Directions of treating quantum errors
- ② Do not to stick to exponential speed-up too much.
- ③ Definitions of “computability”
 - ① If the Turing Machine halts, the problem is solvable.
 - ② If it takes a polynomial time, the problem is solvable.
 - ③ If it takes steps smaller than $\frac{T_{(\text{we can wait})}}{t_{\text{Planck}}} \sim 10^{61}$

Let's return to the main subject: questions to be answered in near future

- ① Directions of treating quantum errors
- ② Do not to stick to exponential speed-up too much.
- ③ Definitions of “computability”
- ③’ Is the Planck time the lower bound of computational clock time?
- ③” Can we use a blackhole for quantum computation? How fast is it?
- ④ Classical numerical algorithm packages guarantee the precision.
We need similar discussion for quantum algorithm packages.
(Quantum algorithms can allocate exponentially large number of addresses in digital way, but as for the amplitude, it is analog.)
- ⑤ In speaking about “entropy”, please specify which area you mean.
About “information”, specify information of A stored in B.
About “entanglement”, specify entanglement between “which and which? (and which? for 3-body, 4-body entanglement...)”

Epilogue

My impression of this “Transformative Research Area” is that it is driven by flexible spirit of the leader and people, and the operation of the whole program is going well.

Evidence: It does not restrict its area too much, and broad areas are tied and collaborating.

Request: Even more inclusive and interacting discussions.

Epilogue

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Thank you for your attention!

– N. I. –