Theorem Proving and Provers Meeting (TPP2020)

中正　和久 @ 山口大

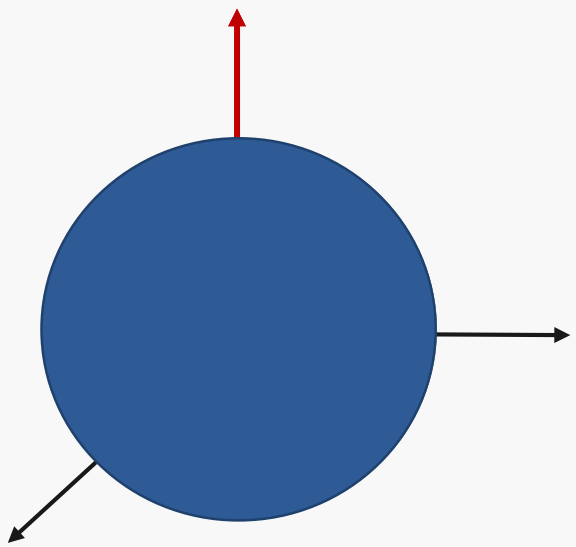
- 15:10～15:40 **Opening; On TPP Mark 2020**
  - 中正 和久@山口大学
- 15:40～16:00 **可換代数の形式化**
  - 渡瀬 泰成
- 16:00～16:10 **Break**
- 16:10～16:30 **MIZAR数学ライブラリの依存関係に関する研究**
  - 重中 晟吾 @ 山口大学大学院
- 16:30～16:50 **Rings, categories and schemes in Coq/SSReflect**
  - QI, Xuanrui @ 名古屋大学多元数理科学研究科
- 16:50～17:10 **Break**

本日のプログラム その2

- **17:10～17:30** Mizar数学ライブラリをホスティングするWebプラットフォームの研究
  - 山道 大地 @ 山口大学大学院
- **17:30～17:50** 定理証明支援系Mizarによる記述を補助するエディタ拡張機能の研究
  - 谷口 広途 @ 山口大学大学院
- **17:50～18:10** Mersenne-Twisterの形式化
  - 才川 隆文 @ 名古屋大学
- **18:30～** Dinner Party
  - Zoomで引き続き

Kochen-Specker Theorem

- Measurements of the squared spin of a spin 1 particle in three orthogonal directions always give the answers 1,0,1 in some order.
- Kochen-Specker Theorem: It is not possible to paint a sphere so that every orthogonal base consists of one white vector and two black vectors.
- Kochen-Specker Theorem can be extended to higher dimensions.



- Sphere is painted in white and black
- Every three vectors that make up an orthogonal basis are colored as one white and two black.

The Free Will Theorem (Conway & Kochen)

- The axioms SPIN, TWIN and MIN imply that the response of a spin 1 particle to a triple experiment is free—that is to say, is not a function of properties of that part of the universe that is earlier than this response with respect to any given inertial frame.

Peres Configuration

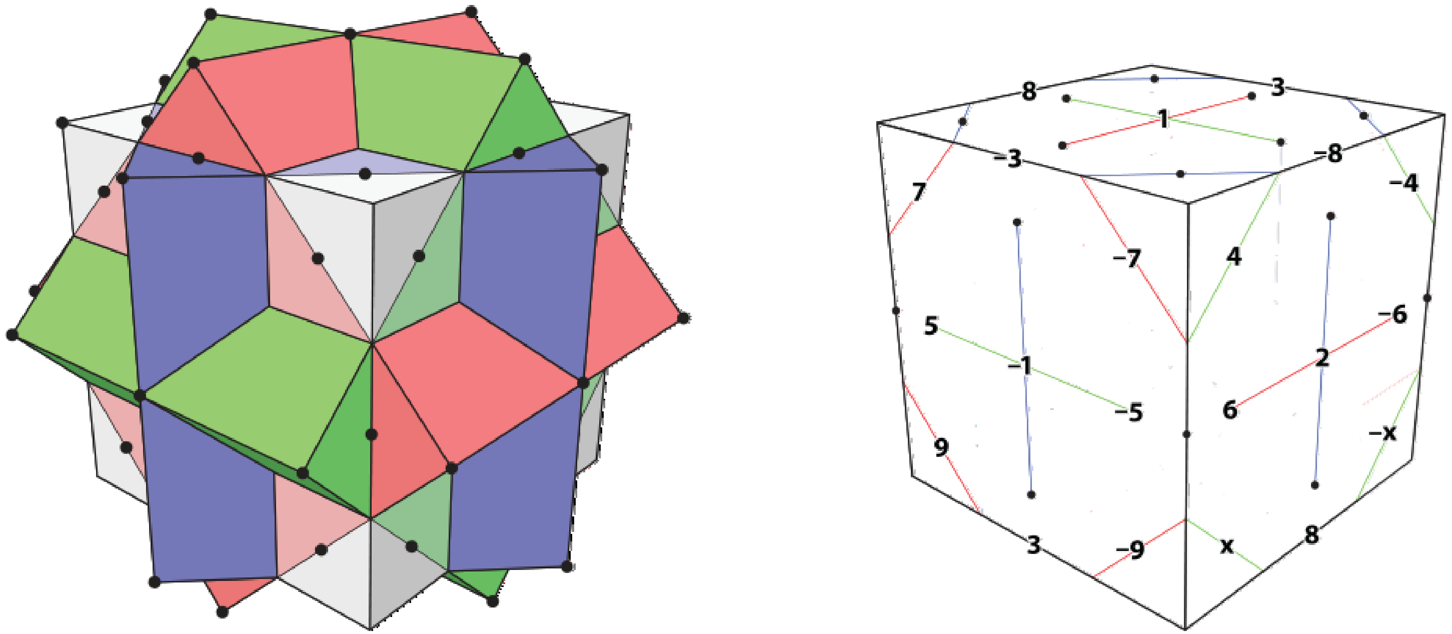


Figure 1a Figure 1b

Figure 1. The three colored cubes in Figure 1a are obtained by rotating the white cube through 45° about its coordinate axes. The 33 directions are the symmetry axes of the colored cubes and pass through the spots in Figure 1a. Figure 1b shows where these directions meet the white cube.

Conway, John H., and Simon Kochen. "The strong free will theorem." *Notices of the AMS* 56.2 (2009): 226-232.

Higher Dimensional Kochen-Specker Set

- $S_4 := \{(1,0,0,0),(0,0,1,0), (0,0,0,1), (1,1,0,0),(0,1,1,0),(0,0,1,1), (1,-1,0,0), (0,1,-1,0),(1,0,1,0), (0,1,0,1), (0,1,0,-1), (1,0,0,1), (1,-1,1,-1), (1,1,-1,-1),(1,-1,-1,1), (1,1,1,-1), (1,1,-1,1), (-1,1,1,1)\}$
- $S_5 := \{(a,0),(0,a) : a \in S_4\} - \{(0,1,0,0,0), (0,0,1,0,0)\}$
- $S_6 := \{(a,0,0),(0,0,a) : a \in S_4\} \cup \{(0,1,0,0,0,0), (1,0,-1,0,0,0), (1,1,1,1,0,0)\} - \{(0,0,1,0,0,0), (0,0,0,1,0,0), (1,1,0,0,0,0), (0,0,1,-1,0,0),(1,-1,-1,1,0,0), (0,1,0,1,0,0)\}$
- $S_7 := \{(a,0,0,0),(0,0,0,a) : a \in S_4\} - \{(0,0,0,1,0,0,0)\}$
- $S_8 := \{(a,0,0,0,0), (0,0,0,0,a) : a \in S_4\}$

Cabello, Adán, José M. Estebaranz, and Guillermo García-Alcaine. "Recursive proof of the Bell–Kochen–Specker theorem in any dimension n> 3." *Physics Letters A* 339.6 (2005): 425-429.

Kochen-Specker Theorem for any finite dimension

- Cabello, Adán, and Guillermo García-Alcaine. "Bell-Kochen-Specker theorem for any finite dimension." *Journal of Physics A: Mathematical and General* 29.5 (1996): 1025.

皆様からの解答

- Jacques Garrigue先生
- 酒井 政裕さん
  - https://github.com/msakai/tppmark2020

Dinner Party ～ 懇親会

- 引き続きZoomで行います.
- ブレイクアウトルームを4箇所設置します.
- 全員に共同ホスト権限を付与しますので，ブレイクアウトルームに自由に出入りしてください.