QUESTIONS

Motivated by ArXiv 2508.19845 (questions in paper) Dec 2025

– C. Walton (talk notes: math.rice.edu/~notlaw/research.html/#47)

---

(1) Is there a "categorical braided structure" whose objects represent a braid group of Type $E_6, E_7, E_8, F_4, G_2, H_3, H_4, I_2(m)$? (Question 3.16)

- Type A = braided monoidal category (well-known)
- Type BC = braided module category (kind of well-known / Müller-W)
- Type D = "symmetric" module category (Müller-W)

---

(2) Take L, L' f.d. Hopf algebras & the Drinfeld doubles $D(L), D(L')$. Then

$D(L)$-Mod $\simeq$ $D(L')$-Mod as braided ⊗ categs $\iff$ L, L' are "categorically Morita eq".

What is the comodule algebra version of this result? (Question 3.11)

- Should involve the "reflective algebras" introduced by Laugwitz-W-Yakimov

---

(3) How can one remove the "H-simplicity" & "augmentation" hypotheses in the main result [Theorem 1.3] of Müller-W? (Question 3.8)

- This would involve circumventing the use of Skryabin's freeness result [TAMS, 2007] in the proof.

---

(4) [R-matrices] are to [Hopf algebras] as [[K-matrices]] are to [[comodule algebras]].

|||
solutions of the quantum YBE
↓
braided monoidal category

"
solutions of the boundary YBE
↓
braided module category

For a fixed quasitriangular Hopf algebra H, and fixed H-comodule algebra B, what are all of the K-matrices of B (up to braided Morita equivalence)?

- Done for all coideal subalgebras of $\Bbbk G$, for G finite group [Müller-W]
- Done for all coideal subalgebras of the Sweedler Hopf algebra [Müller-W]

Key: ☼ Pie in the sky ☁ categorical ⋀⋀⋀ computational