

# WABASH EXTRAMURAL MODERN ANALYSIS SEMINAR

March 31

2:00 p.m.

at

**Wabash College**

in rooms 114 and 118 Baxter Hall

*Times given are Eastern Time,  
which is currently local time for Central Indiana and Ohio.*

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|------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>2:00–2:30</b> | <i>Refreshments and conversation</i>                                                                                               |
| <b>2:30–3:30</b> | <b>(Non)commutative geometry of wire network graphs from triply periodic surfaces</b><br><i>BIRGIT KAUFMANN, Purdue University</i> |
| <b>3:30–4:00</b> | <i>More refreshments and conversation</i>                                                                                          |
| <b>4:00–5:00</b> | <b>Entropy and <math>L^2</math>-torsion</b><br><i>HANFENG LI, University at Buffalo, SUNY</i>                                      |
| <b>5:00–...</b>  | <i>Refreshments and farewells</i>                                                                                                  |

The purpose of Wabash Seminar talks is to present surveys of interest to all analysts, including graduate students and scholars working in areas far from the speaker's specialty. Come and meet your fellow analysts, learn what's going on, and spread the word.

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| Next Meeting: TBA |
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*For further information call*

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# **(Non)commutative geometry of wire network graphs from triply periodic surfaces**

BIRGIT KAUFMANN

We show how to attach a  $C^*$ -algebra to an embedded graph with a lattice translational symmetry. This system is designed to describe a system of nano wires which is obtained as the complement of periodic surfaces, notably the gyroid. We start by introducing the geometrical structure of the double gyroid and its fabrication as nano material as background. The non-commutative geometry appears when turning on a magnetic field. In this setting the gyroid geometry is a 3d generalization of graphene. We classify the resulting algebras - the non-commutative geometry is closely related to non-commutative 3-tori as we discuss in detail. We end with a conjecture relating the degeneracies in the commutative case with the special points in the non-commutative case. This is joint work with R. Kaufmann and S. Khlebnikvo

## **Entropy and $L^2$ -torsion**

HANFENG LI

Given any countable discrete group  $G$  and any countable left module  $M$  of the integral group ring of  $G$ , one may consider the natural action of  $G$  on the Pontryagin dual of  $M$ . Under suitable conditions, the entropy of this action and the  $L^2$ -torsion of  $M$  are defined. I will discuss the relation between the entropy and the  $L^2$ -torsion, and indicate how this confirms the conjecture of Wolfgang Luck that any nontrivial amenable group admitting a finite classifying space has trivial  $L^2$ -torsion. This is joint work with Andreas Thom.