

Fachtagung über "Allgemeine Algebra und Grenzgebiete"
(27.10 bis 1.11.1980, Almsfeld/Harz, D.D.R.)

René GUITART, U.E.R. de Maths, tours 45-55, 5^{ème} étage,
Université PARIS 7, 2 place Jussieu, 75005 PARIS.

1st talk (29/10/80) : EXACT SQUARES AND REALITY (Abstract).

In this talk, I describe how Category Theory appears as an extended mathematical logic, with a dialectical flavor, and how we can say that

$$\text{LOGIC} = \text{HOMOLOGY.}$$

The main tool to make precise and usefull this philosophy is the calculus of exact squares in an arbitrary 2-category. Such a calculus contains the usual calculus of exact sequences in Ab and, in the same time, the calculus of adjoint functors (and full & faithful functors, and Kan extensions, and comma objects, etc.) in Cat .

If a "reality" is described "combinatorically" by a category \underline{C} , we can then find a "rational part" of it in the rules of the calculus of exact squares and monads in the 2-category $\text{FIB}(\underline{C})$ of fibrations over \underline{C} . At this level, the dialectic of the scientific activity in \underline{C} can be observed explicitly.

Details and applications can be founded in my papers :

- (1) Relations et carrés exacts, to appear in Ann. Sc. Math. Qué.
- (2) Qu'est-ce que la logique dans une catégorie ?, to appear in Proc. 3^d Conf. on Cat.Alg., Amiens 1980 (in : Cahiers Top.Géo.Diff.).

2^d talk (30/10/80) : TENSORS (Abstract).

I emphasize the place of the "monoidal structure"

$$D_{X,Y} : PX \otimes PY \longrightarrow P(X \otimes Y)$$

on a monad P in the construction of tensor products of P -algebras

(In this way I get for instance associative tensor products of algebras

of an arbitrary commutative theory over Set).

So I get a deeper understanding of works on non-deterministic machines (Arbib-Manes, E.Burroni, Ehrig &als).

Details and applications can be founded in my paper :

(3) Tenseurs et machines, Cahiers Top.Géo.Diff., XXI, 1 (1980).

N.B. The papers (1),(2),(3), are available on request to the author.