

SATURDAY, 2:00 P.M.

Invited Address, 314 Altgeld Hall

A survey of homotopy theory of spheres
Professor Mark E. Mahowald, Northwestern University

SATURDAY, 3:15 P.M.

Special Session on Categorical Algebra, 314 Altgeld Hall

3:15-3:35

(12) On derived functors and cohomology
Professor Michael Barr, University of Illinois (652-5)

3:40-4:00

(13) Applied functorial semantics
Professor F. E. J. Linton, Wesleyan University (652-3)

4:05-4:25

(14) The calculus of comma categories
Professor J. W. Gray, University of Illinois (652-4)

4:30-4:50

(15) Categorical dynamics
Professor F. W. Lawvere, City University of New York (652-2)

4:55-5:15

(16) Descent and standard constructions (triples)
Professor J. M. Beck, Cornell University (652-8)

Urbana, Illinois

Paul T. Bateman
Associate Secretary



NEWS ITEM

MATSCIENCE SIXTH ANNIVERSARY SYMPOSIUM

The Matscience Sixth Anniversary Symposium will take place in January, 1968, for two weeks. The sessions will be divided into three sections: theoretical physics, pure mathematics, and operations research and applications of stochastic processes. Among the scientists participating are Professors Roland Good, U.S.A.; S. Okubo, U.S.A.; W. H. J. Fuchs, U.S.A.; Shreeram Abhyankar, U.S.A.; Alladi Ramakrishnan, Matscience; S. K. Srinivasan, I. I. T., Madras; K. R. Unni, Matscience; and Drs. A. M. Lee, Canada; H. P. Stapp, U.S.A.; Gordon Shaw, U.S.A.; B. Misra, Switzerland; V. Devanathan, University of Madras. There will also be

representatives from various research institutions and universities in India.

The session on operations research and applications of stochastic processes, a new feature of the symposium, will be led by Dr. A. M. Lee, Director, Operations Research, Air Canada. Professor R. Vasudevan, Matscience, will give a general summary of some of the applications of the theory of stochastic processes to some physical problems.

Individuals interested in participating in the symposium may obtain further information from the Institute of Mathematical Sciences, Adyar, Madras-20, India.

The November Meeting in Urbana, Illinois

November 25, 1967

652-1. ROBERT SPIRA, Michigan State University, East Lansing, Michigan. Nonnegative matrices with nonnegative inverses.

It is shown that if a matrix $A = [a_{ij}]$, $a_{ij} \geq 0$, is invertible and has more than n $a_{ij} > 0$, then A^{-1} has both positive and negative entries. Thus, a matrix A is of the form PD with P a permutation matrix and D a diagonal matrix with positive diagonal elements if and only if A is invertible and both A and A^{-1} have nonnegative entries. An integer matrix which maps the positive n -tuples onto themselves is a permutation matrix. (Received August 29, 1967.)

652-2. F. W. LAWVERE, City University of New York, 33 West 42nd Street, New York, New York 10036. Categorical dynamics.

Axioms are given and discussed for categories in which classical particle and fluid dynamics can be discussed without explicit introduction of real numbers. Though these categories are much more "pleasant" than those of differentiable manifolds, etc., we are able, using the notions of algebraic theory and of topos, to show the existence of categories satisfying the axioms, the method promises to extend to quantum mechanics. (Received September 14, 1967.)

652-3. FRED LINTON, Wesleyan University, Middletown, Connecticut 06457. Applied functorial semantics.

Among some nontrivial specializations of Jon Beck's tripleability theorem are the Stone duality theory and a generalization of Lawvere's characterization of algebraic categories. (Received September 14, 1967.)

652-4. J. W. GRAY, University of Illinois, Urbana, Illinois 61801. The calculus of comma categories.

Comma categories (F,G) as introduced by Lawvere are an important tool in category theory and deserve systematic treatment. So far, five operations and their relations seem useful. (i) a product $(F,G) \times_A (G,H) \rightarrow (F,H)$; (ii) The identification of natural transformations from F to G with functors $A \rightarrow (F,G)$ (Courtesy of Jon Beck); (iii) If $m: F' \rightarrow F$ and $n: G \rightarrow G'$ are natural transformations then there is an induced functor $\overline{(m,n)}: (F,G) \rightarrow (F',G')$; (iv) If m and n are as in (iii) then there is a system of natural transformations involving functors between (MF,NG) , (MF,NG') , (MF',NG) , (MF',NG') and (M,N) ; (v) A hyperproduct involving comma categories whose entries are projections of other suitable comma categories onto their factors. Among the applications which flow smoothly from this machine are hom functors (of course), a treatment of adjoint functors (Jon Beck suggested that this should exist) and the triple on (Cat, B) whose algebras are split fibrations over B . (Received September 14, 1967.)