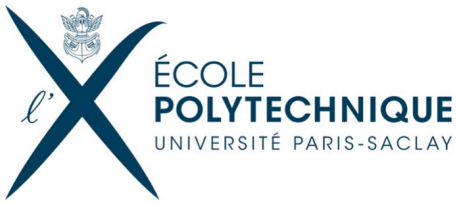
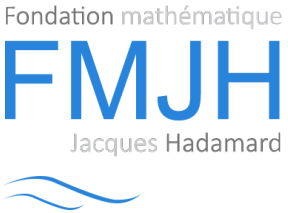
Centre de mathématiques Laurent Schwartz

UMR 7640 - École polytechnique/CNRS

September 6, 2017

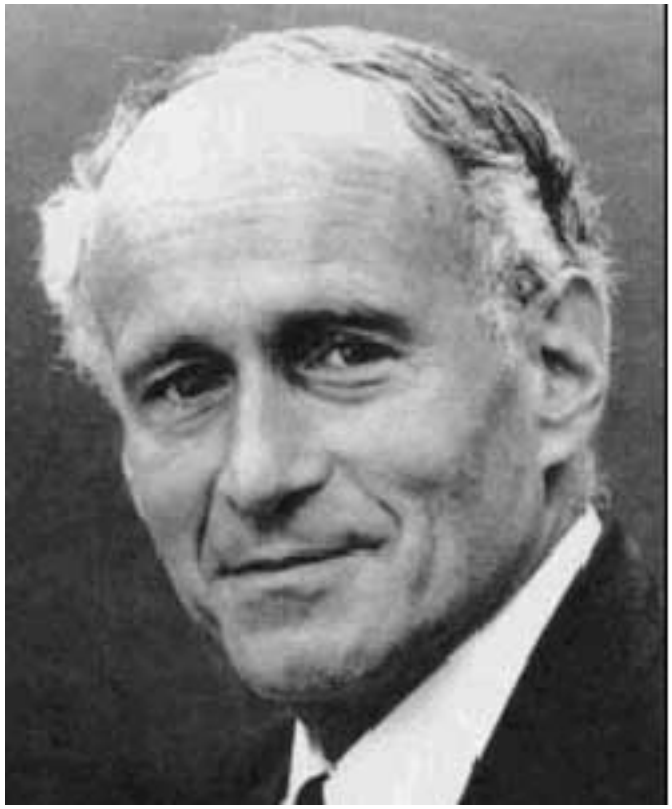




- *Charles Favre* : head of the laboratory
  in charge of questions related to research

- *Bertrand Remy*: president of the department
  responsible for all educational issues

Laurent Schwartz (1915 – 2002)



- Specialist in functional analysis
- Fields medalist in 1950 for his contribution to the theory of distributions
- Founder of the center of mathematics at the Ecole Polytechnique in 1965

Computer team
(joint with CPHT and CMAP)
J.-L. Bellon, *IR CNRS*
D. Delavennat, *IR CNRS*
S. Ferrand, *IR X*
D. Pham Kim, *AI CNRS*

Head

C. Favre, *DR/PCC*

Administration

P. Fuseau, *IR X*
C. Juppin, *IE X*
M. Amier, *AI X*

Analysis and partial differential equations

T. Paul, *DR*

Y. Brenier, *DR*
F. Golse, *PR X*
D. Han-Kwan, *CR/PCC*
M. Leautaud, *PR Hadamard*
Y. Martel, *PR X*

Post-Doctorants:
L. Cesbron, *FMJH*

PhD students:
A. Baradat
N. Brigouleix
L. Laflèche
T.-V. Nguyen

Algebra and arithmetics
D. Renard, *PR X*

S. Bijakowski, *PR Hadamard*
J. Fresan, *PR Hadamard*
P. Harinck, *CR*
F. Orgogozo, *CR/PCC*
A. Plagne, *ICA*
B. Rémy, *PR X*
C. Sabbah, *DR*
B. Schraen, *CR/PCC*

Post-Doctorants:
E. Balzin, *FMJH*
I. Gaisin, *ANR*

PhD students:
E. Ambrosi
V. De Daruvar
M. Kochersperger
T. H. Nguyen
N. Martin
R. Riblet

Geometry and dynamics

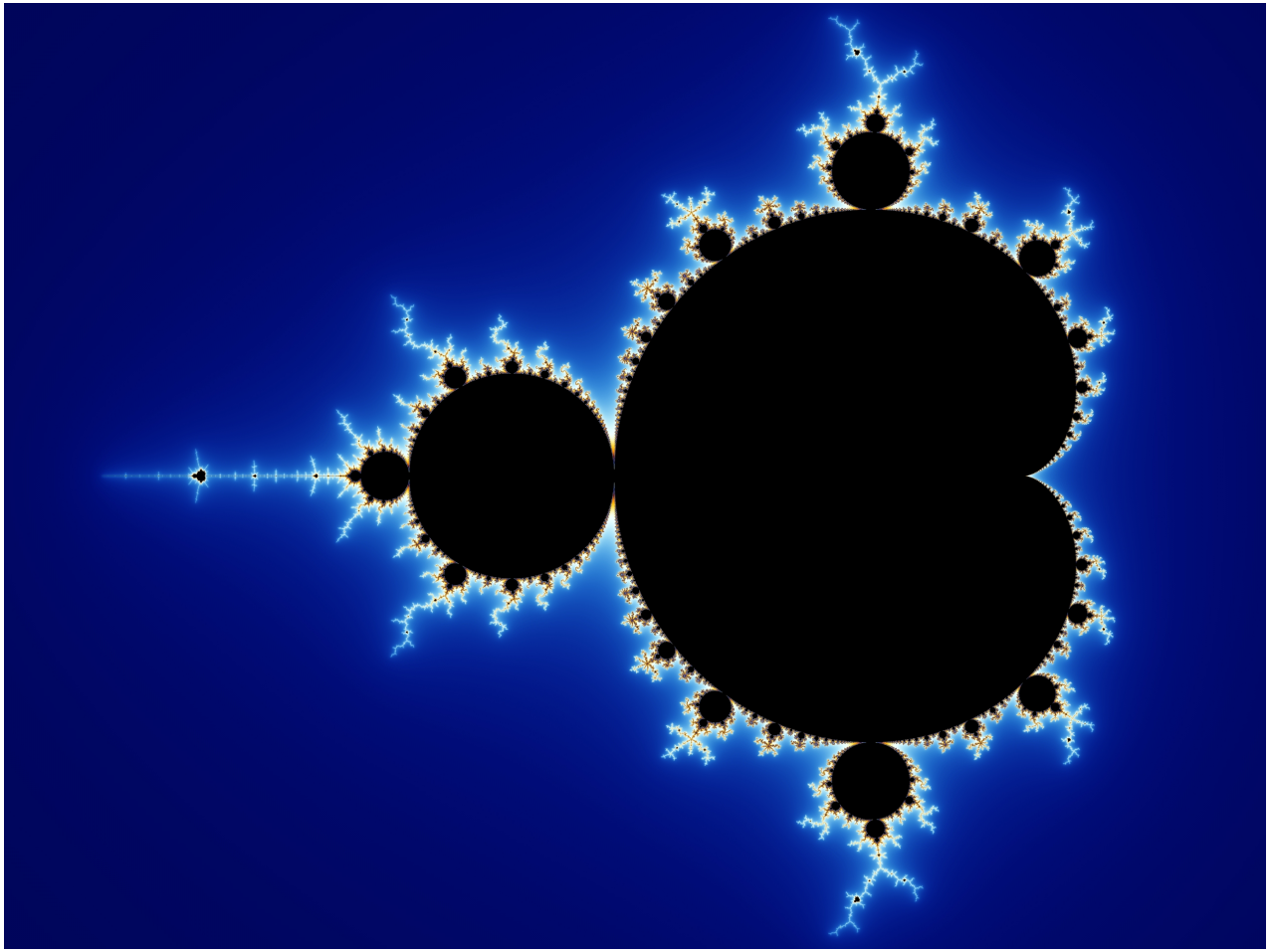
S. Boucksom, *DR/PCC*

C. Favre, *DR/PCC*
C. Margerin, *ICA*
F. Pacard, *DER X*
P. Gauduchon, *DR emeritus*

Post-Doctorants:
R. Dervan, *ANR*

PhD students:
N-B Dang
F. Gironella
M. Manzaroli
Z. Sjöström Dyrefelt
J. Wang

The Mandelbrot set



Benoit Mandelbrot (1924 – 2010)

- Father of fractal geometry
- Wolf prize in physics in 1993
- Important paper in 1980
  « fractal aspects of the iteration of $z \rightarrow \lambda z (1-z)$ for complex λ and z »

Formal definition of M

- Pick $c \in \mathbf{C}$
- Define the sequence

$$z_0 = 0$$

$$z_{n+1} = z_n^2 + c$$

- When $z_n \to \infty$: blue dot
- When z_n is bounded: black dot

Three theorems and a conjecture about M

1. M is connected (Sibony, Douady-Hubbard)

2. Small copies of M are dense (Douady-Hubbard)

3. The boundary/frontier of M has dimension 2 (Shishikura)

4. The Fatou conjecture: partial results by Yoccoz (1994), McMullen (1998), Lyubich.

Some programs to draw the Mandelbrot set

- http://www.mndynamics.com/indexp.html
- https://www.math.kyoto-u.ac.jp/~inou/qfract/
- http://dhushara.com/DarkHeart/
- http://www.math.harvard.edu/~ctm/programs/index.html
- https://fractint.org/

The program I used for my videos:

- http://matek.hu/xaos/doku.php