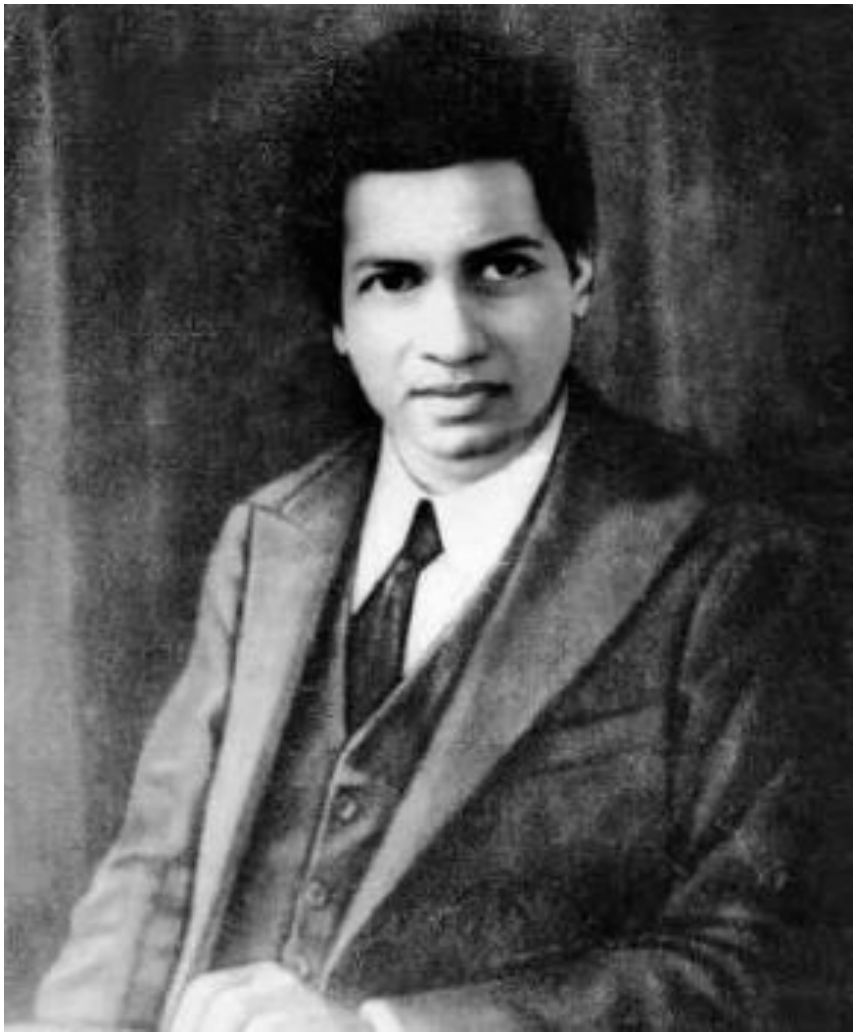
3rd Srinivasa Ramanujan Prize* Ceremony

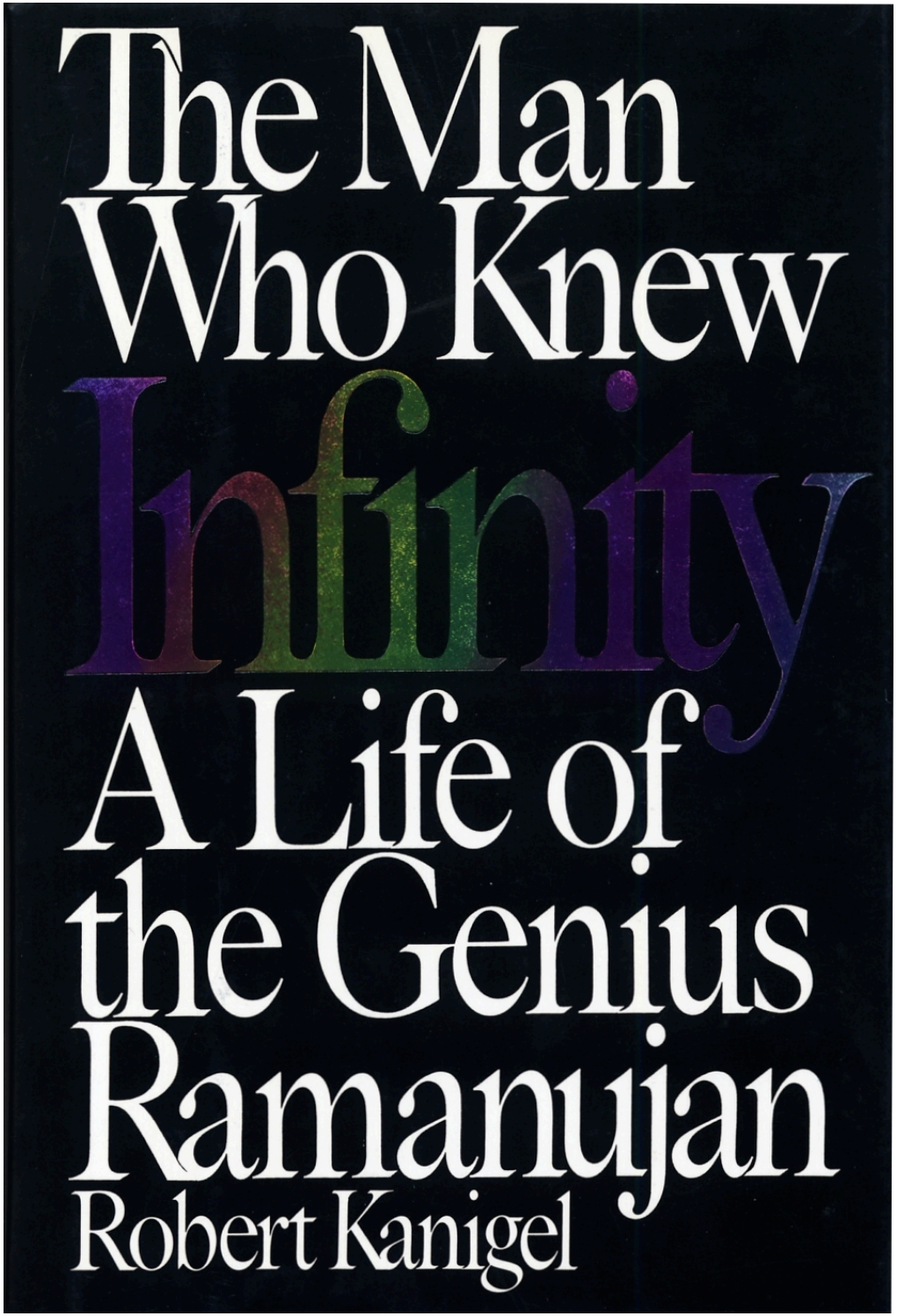
Professor Jorge Lauret
Differential Geometry Group
Faculty of Mathematics, Astronomy and Physics
Universidad Nacional de Còrdoba
Argentina

***Sponsored by the Abel Fund in cooperation with IMU**
(for an outstanding mathematician in developing countries below 45)



SRINIVASA RAMANUJAN 1887-1920

Srinivasa Ramanujan was a mathematician so great that his name transcends jealousies…
Professor E.H. Neville (1941)


The Man
Who Knew
Infinity
A Life of
the Genius
Ramanujan
Robert Kanigel

Highlights of Life

Born	**December 22, 1887**
Enters College (does not complete it)	**1903**
Marriage	**1909**
Odd jobs	**until 1912**
Clerk in Madras Port Trust	**1912**
Cambridge University	**1914**
Fellow of Trinity	
Fellow of the Royal Society	**1918**
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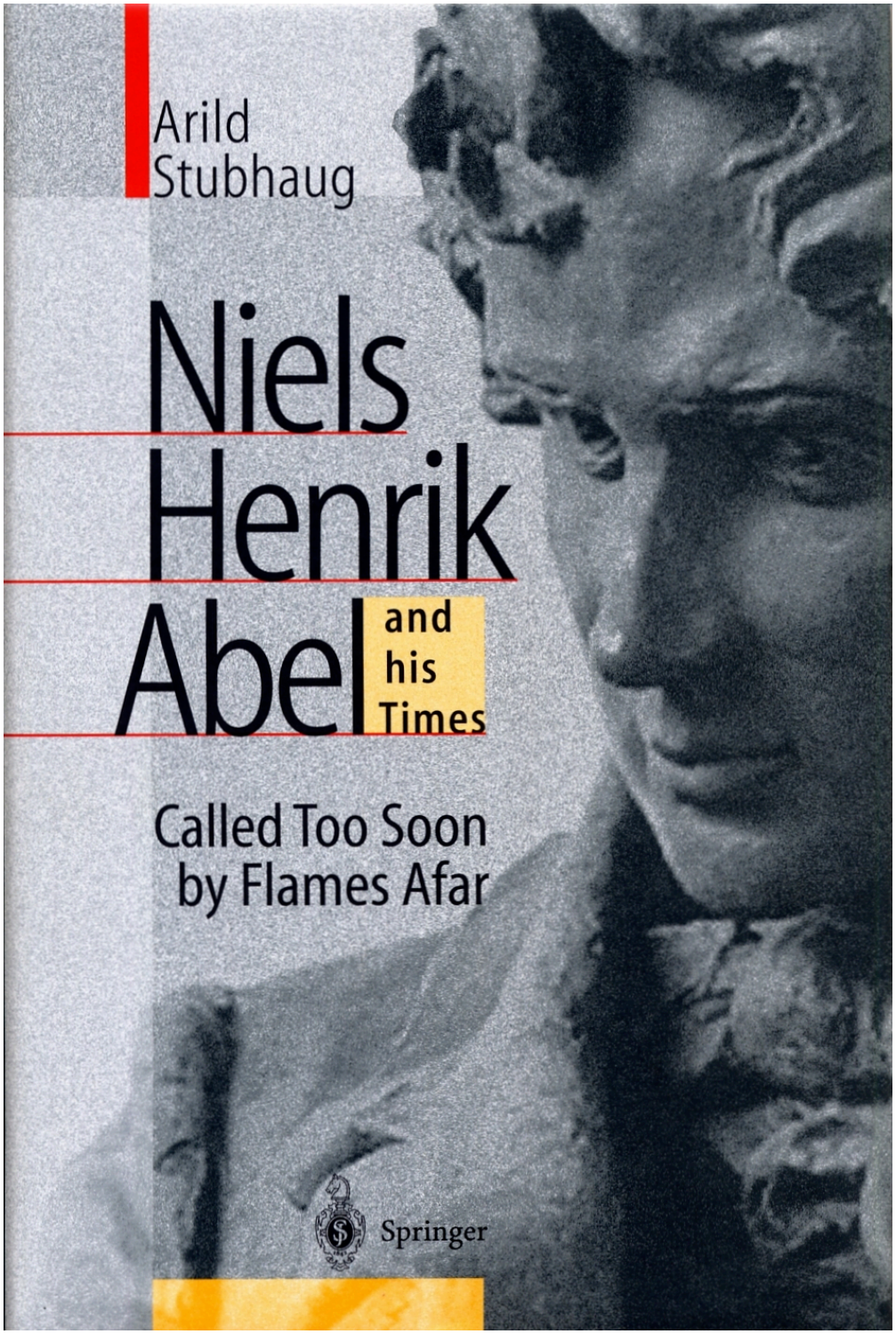
G.H. Hardy (1877-1947)

Whenever I am angry or depressed, I pull down the collected works [of Ramanujan] from the shelf …They are full of beautiful ideas which may help you to do more interesting mathematics.—Freeman J. Dyson (1987)

NEILS HENRIK ABEL 1802-1829


Arild
Stubhaug
Niels
Henrik
Abel
and
his
Times
Called Too Soon
by Flames Afar
Springer

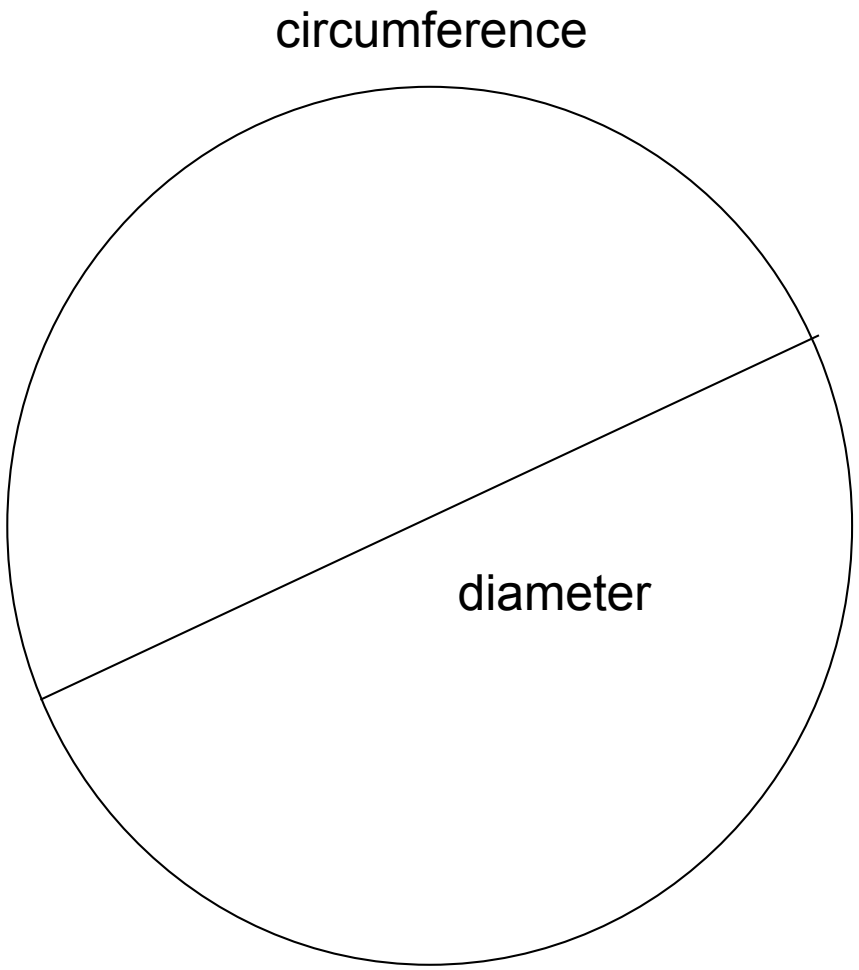
Ramanujan

Abel

Prize winner in 2005
Viana, IMPA

Prize winner in 2006
Sujatha, TIFR

Ramanunjan Prize winner Ramdorai Sujatha met Norwegian Prime Minister Jens Stoltenberg and Abel Laureate Srinivasa Varadhan at Akershus Castle. (Photo: Heiko Junge)



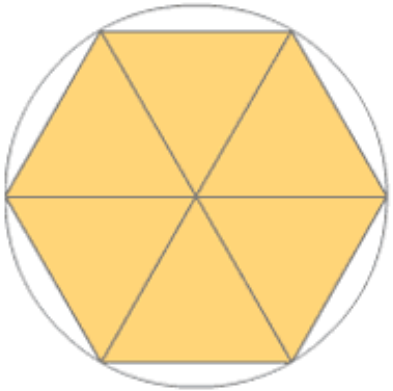
π

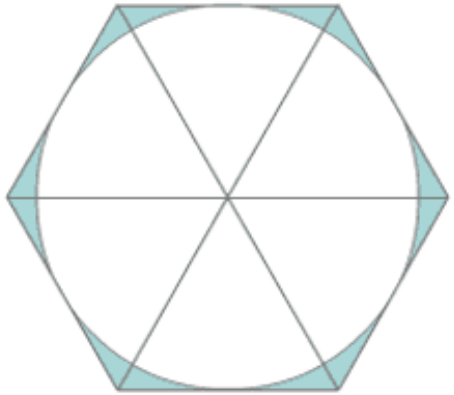
π appears in many places in physics, mathematics, biology, engineering, … which have nothing to do with circles.

π = circumference/diameter

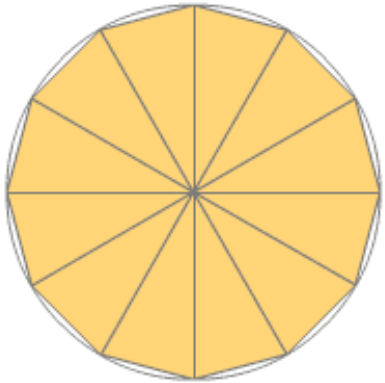
- Archimedes (287-212 BC) estimated π to be 3.14.
- His bounds for π were 22/7 and 223/71, obtained by computing the perimeter of circumscribed and inscribed polygons.
- Many efforts have been made to determine it to a large number of decimal places.
- π appears in many contexts; an irrational and transcendental number; a benchmark computation; opens new vistas in number theory; …, and “because it is there”.

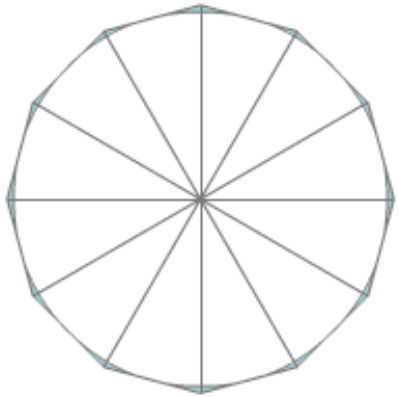
Archimedes' method of successive approximation





6-Sided Polygon
inscribed perimeter = 3.0
circumscribed perimeter
= 3.4641





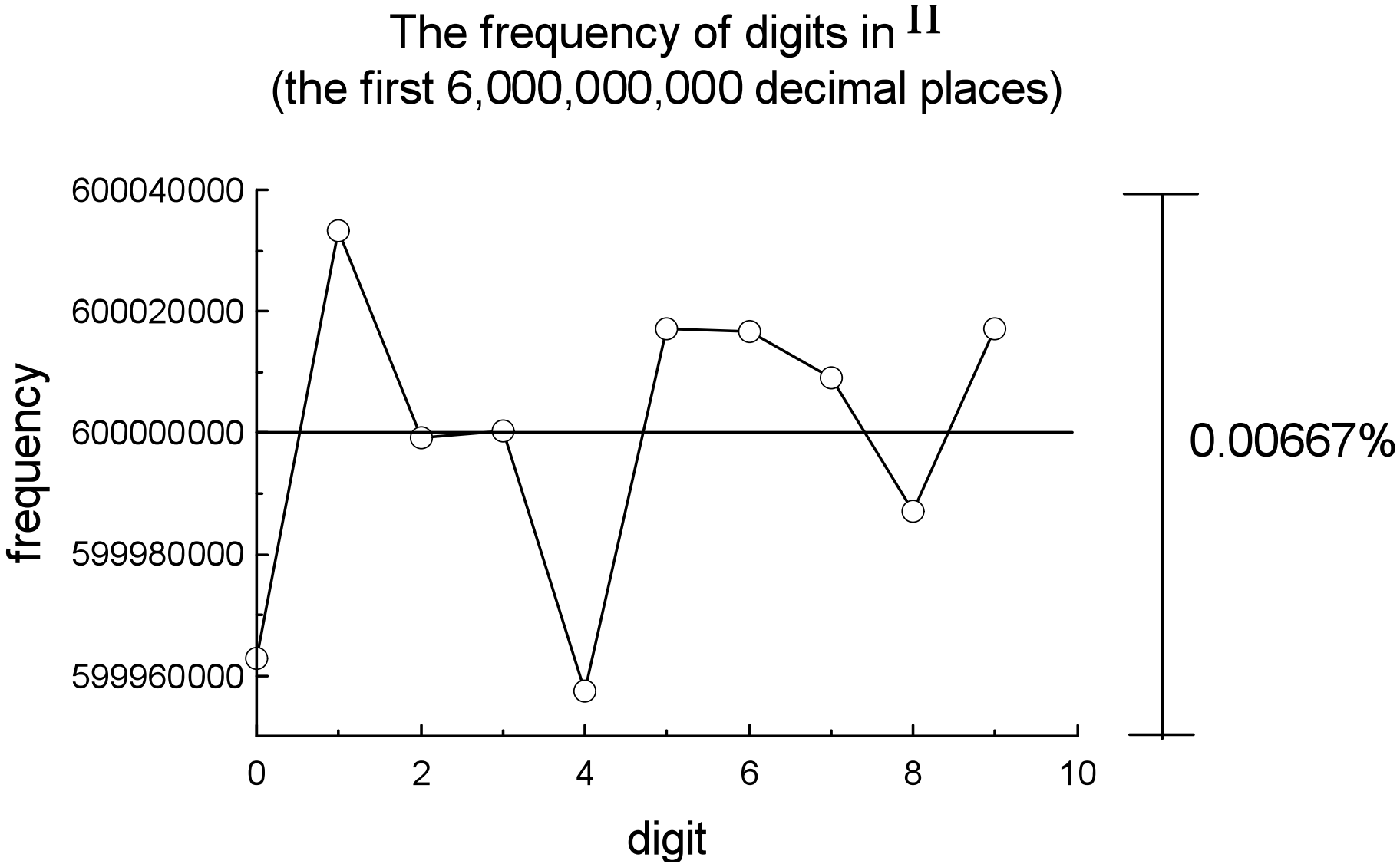
12-Sided Polygon
inscribed perimeter
= 3.1058
circumscribed perimeter
= 3.2154

- The circumference of the circle girdling the universe ~ 40 billion light years ~10^{29} cm
- The diameter of hydrogen atom ~ 10^{-8} cm
- Ratio = 10^{37}
- If one specifies π to 37 decimal places, one knows the circumference of the universe to the accuracy of the diameter of hydrogen atom.

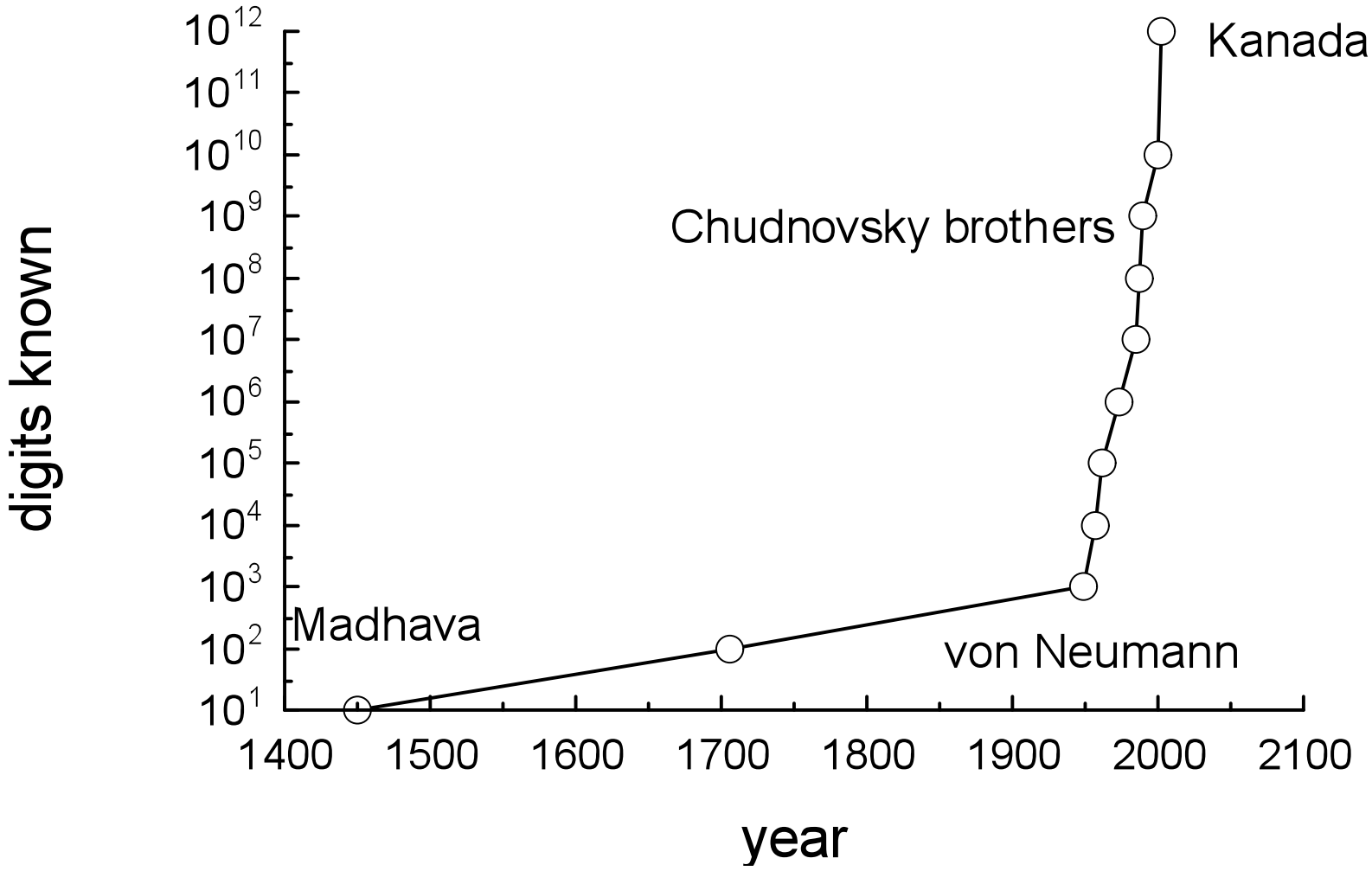
The record in determining π

1,241,100,000,000 decimals

set by Kanada and his team in 2002


The frequency of digits in π
(the first 6,000,000,000 decimal places)
600040000
600020000
600000000
599980000
599960000
frequency
0
2
4
6
8
10
digit
0.00667%

Known digits in π



Ramanujan (1914)

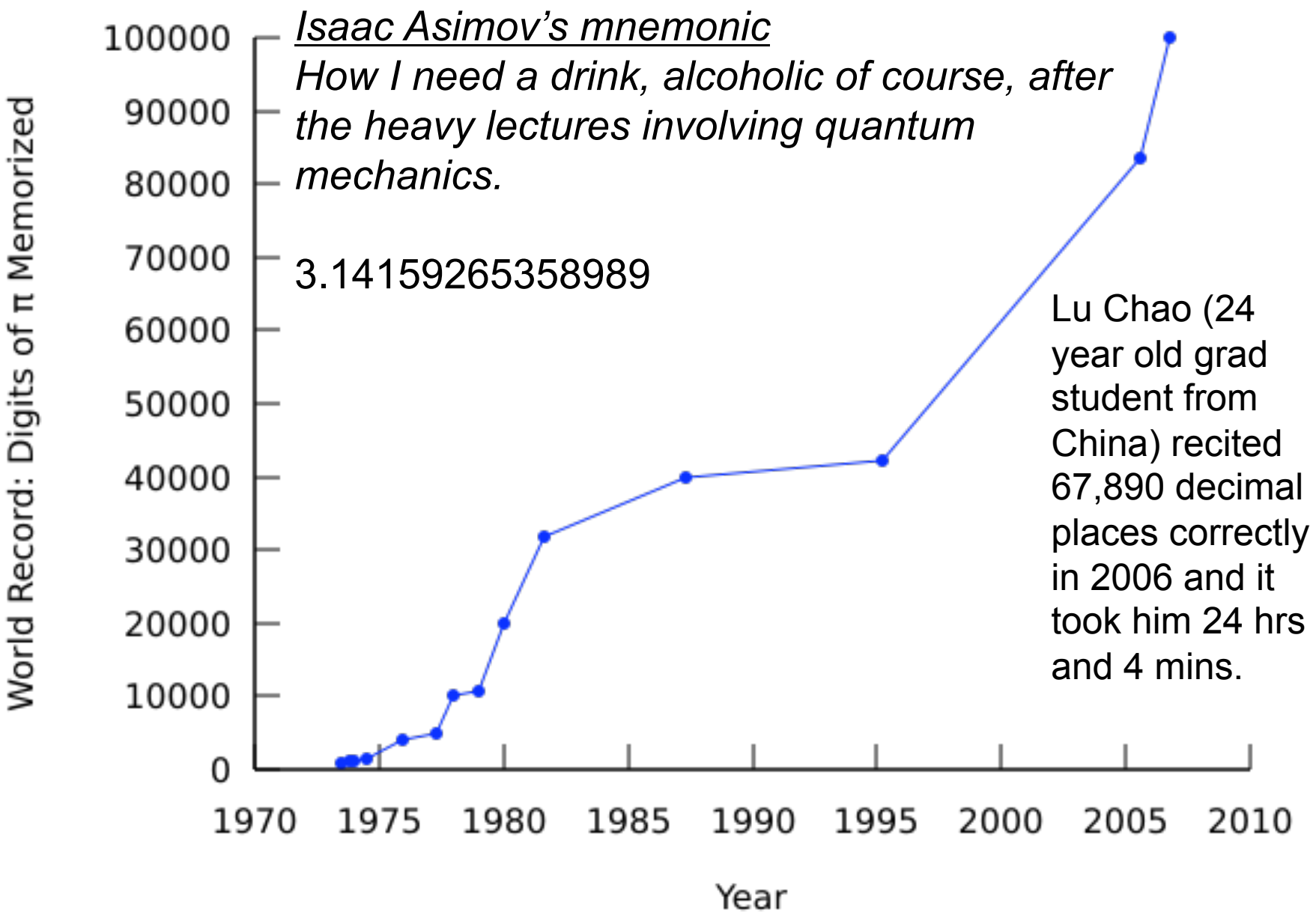
$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

(adds about 8 decimal places per term)

Gregory and David Chudnovsky's extension (1989)

$$\frac{426880\sqrt{10005}}{\pi} = \sum_{k=0}^{\infty} \frac{(6k)!(13591409 + 545140134k)}{(3k)!(k!)^3(-640320)^{3k}}$$

(adds 14 decimal places per term)
Computed π to one billion places for the first time.


Isaac Asimov's mnemonic
How I need a drink, alcoholic of course, after the heavy lectures involving quantum mechanics.
3.14159265358989
Lu Chao (24 year old grad student from China) recited 67,890 decimal places correctly in 2006 and it took him 24 hrs and 4 mins.
World Record: Digits of π Memorized
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1970
1975
1980
1985
1990
1995
2000
2005
2010
Year

The 2007 Prize Selection Committee

Bernt Oksendal (Oslo)

Jacob Palis (IMPA)

Peter Sarnak (Princeton)

Le Dung Trang (ICTP, Chairman)

Srinivasa Varadhan (Courant)

(2007 Abel Laureate)

The Royal Handshake

Citation

The 2007 Ramanujan Prize is awarded to Professor Jorge Lauret in recognition of his outstanding contributions to differential geometry and group representations. They include his (negative) answer to a question posed by Selberg in 1956. In recent years, Lauret has made significant progress in the classification of non-compact Einstein manifolds. In the process, he introduced new and powerful tools to the field.

Thank you

Godfrey Harold Hardy 1877-1947

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