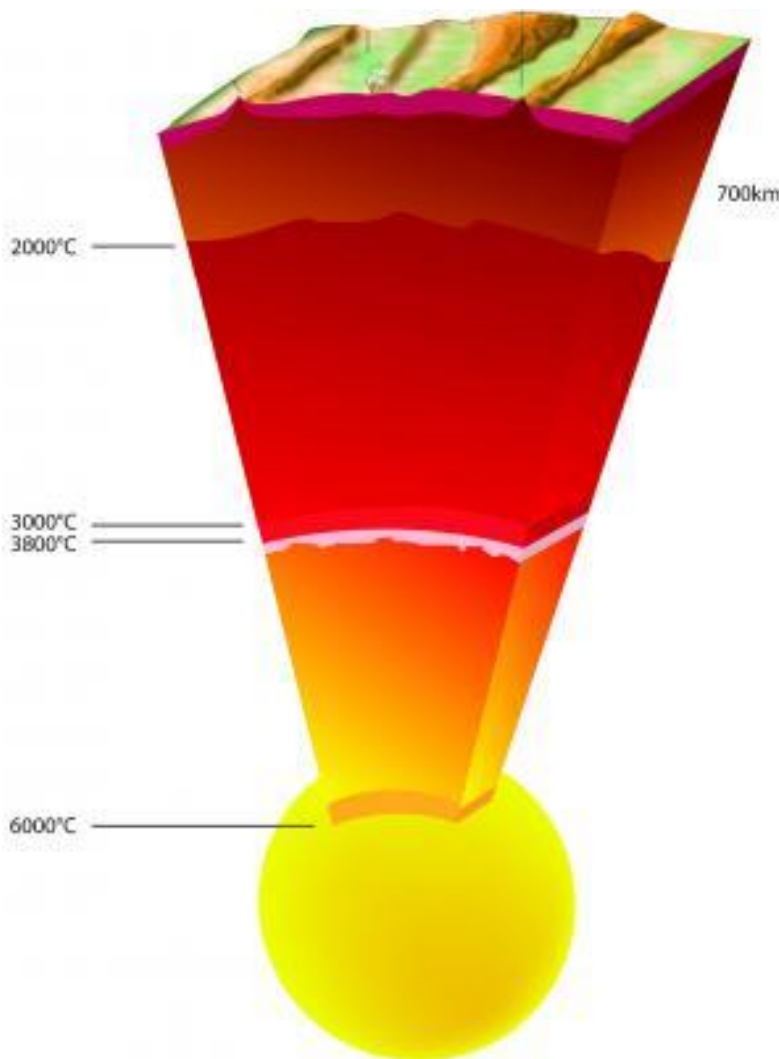


The Earth's center is 1,000 degrees hotter than previously thought

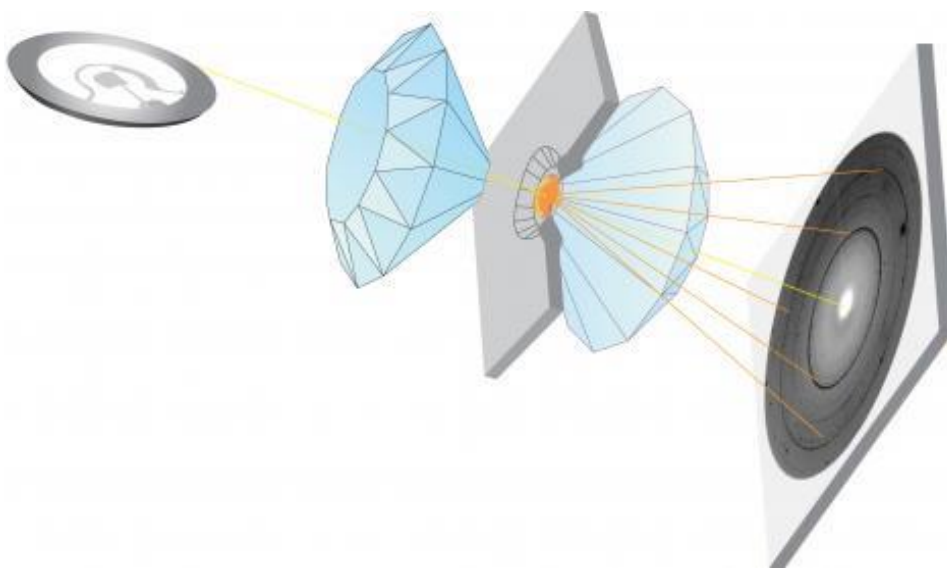


Scientists have determined the temperature near the Earth's centre to be 6000 degrees Celsius, 1000 degrees hotter than in a previous experiment run 20 years ago. These measurements confirm geophysical models that the temperature difference between the solid core and the mantle above, must be at least 1500 degrees to explain why the Earth has a magnetic field (磁場). The scientists were even able to establish why the earlier experiment had produced a lower temperature figure. The results are published on 26th April 2013 in *Science*.

The research team was led by Agnès Dewaele from the French national technological research organization CEA, alongside members of the French National Center for Scientific Research CNRS and the European Synchrotron Radiation Facility ESRF in Grenoble (France).

The Earth's core consists mainly of a sphere of liquid iron at temperatures above 4000 degrees and pressures of more than 1.3 million atmospheres. Under these conditions, iron is as liquid as the water in the oceans. It is only at the very centre of the Earth, where pressure and temperature rise even higher, that the liquid iron solidifies. Analysis of earthquake-triggered seismic waves passing through the Earth, tells us

the thickness of the solid and liquid cores, and even how the pressure in the Earth increases with depth. However these waves do not provide information on temperature, which has an important influence on the movement of material within the liquid core and the solid mantle above. Indeed the temperature difference between the mantle and the core is the main driver of large-scale thermal movements, which together with the Earth's rotation, act like a dynamo (發電機) generating the Earth's magnetic field. The temperature profile through the Earth's interior also underpins geophysical models that explain the creation and intense activity of hot-spot (熱點) volcanoes like the Hawaiian Islands or La Réunion.



To generate an accurate picture of the temperature profile within the Earth's centre, scientists can look at the melting point of iron at different pressures in the laboratory, using a diamond anvil cell to

compress speck-sized samples to pressures of several million atmospheres, and powerful laser beams to heat them to 4000 or even 5000 degrees Celsius."In practice, many experimental challenges have to be met", explains Agnès Dewaele from CEA, "as the iron sample has to be insulated (絕緣) thermally and also must not be allowed to chemically react with its environment. Even if a sample reaches the extreme temperatures and pressures at the centre of the Earth, it will only do so for a matter of seconds. In this short timeframe it is extremely difficult to determine whether it has started to melt or is still solid".

This is where X-rays come into play. "We have developed a new technique where an intense beam of X-rays from the synchrotron can probe a sample and deduce whether it is solid, liquid or partially molten within as little as a second, using a process known diffraction", says Mohamed Mezouar from the ESRF, "and this is short enough to keep temperature and pressure constant, and at the same time avoid any chemical reactions".

節目名稱	講者	日期	時間	地點
中國和香港的水資源 情況 - 人水相融	李焯芬教授 (香港大學專 業進修學院院長)	18.5.2013(星期六)	下午 2:30- 3:15	香港科學館 演講廳
中國和香港的水資源 情況 - 未雨綢繆	麥成章先生 (水務署總工 程師)	18.5.2013(星期六)	下午 3:20 - 4:05	

註：每次講座完畢後都附有 25 分鐘(4:05pm-4:30pm)答問時間

語言: 粵語 (conducted in Cantonese)

票價: 免費活動 · 即場入座 · 座位先到先得

查詢電話：2732 3223 (星期一至五：上午九時至下午一時；下午二時至五時 · 公眾假期除外)

SCIENCE SEMINAR@ SCHOOL

Topic: Hydrogen Storage and Fuel Cell 化學氫氣儲存和燃料電池

Lecturer: Dr. Tang, Christina Y C 鄧玉菁博士

Date: 15th May, 2013 (Mon)

Venue: Chemistry Laboratory (Rm512)

All teachers and students are welcome!

Time to Relax!

Please join the last science seminar this school term on 13/5(Mon)! Don't miss this golden chance!

5	3			7				
6			1	9	5			
	9	8					6	
8				6				3
4			8		3			1
7				2				6
	6					2	8	
			4	1	9			5
				8			7	9

Previous Sudoku Answer:

8	2	3	6	5	7	4	1	9
1	5	9	8	2	4	6	3	7
6	7	4	3	9	1	5	2	8
2	6	1	7	8	5	3	9	4
7	3	5	2	4	9	8	6	1
9	4	8	1	6	3	7	5	2
3	9	7	5	1	8	2	4	6
5	1	2	4	7	6	9	8	3
4	8	6	9	3	2	1	7	5

Fun Fact:

It's breathtaking to consider:



You have two eyes, each composed of 130 million photoreceptor cells. In each one of those cells, there are 100,000,000,000,000 (100 trillion) atoms – that's more than all the stars in the milky way galaxy.

However, each atom in each cell in each eye formed in the core of a star, billions of years ago, and yet, here they are today, being utilized to capture the energy released from that same process.

All to expand the consciousness that is YOU.

The universe has an interesting sense of irony, in that you are the universe experiencing itself – All you are is a thought.

SCIENCE SOCIETY 2012-13

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