

# 『大師對談』

## --朱敬一院士、徐遐生院士、劉兆漢院士經驗分享



朱敬一院士 29 歲取得美國密西根大學經濟學博士，43 歲成為當時最年輕的中研院院士，92 年榮獲總統科學獎，53 歲成為中經院最年輕的董事長，現任政務委員兼國科會主委，是位參與學術、實務及社會活動的經濟學者。除了在學術領域的非凡成就外，他還是位功夫高手，打了 33 年的太極拳，可見他的「功力」深不可測。他也是一位非常關心學校教育的院士，自 2007 年開始連續三年分別至北、中、南的高中上一學期的社會科學課，是第一位走進高中校園，用深入淺出的方式，引導剛從國中畢業的學子走入人文與社會科學世界的中研院院士。



徐遐生院士是國際知名的理論天文物理學家，專長研究行星誕生，被公認為世界頂尖天文物理學者之一。尤其是徐院士的漩渦狀星系形成，以及恆星形成等 2 大理論，獲得極高學術尊崇。徐院士同時也是罕見同時獲選為美國國家科學院院士(1987 年)、中央研究院院士(1990 年)、美國國家藝術與科學院院士(1992 年)等 3 項學術榮譽於一身的學者。2005 年，荷蘭最古老的學校萊登大學天文台將新發現的一顆小行星以徐遐生英文名字 Frank Shu 命名。2009 年十月，有亞洲諾貝爾獎之稱的「邵逸夫獎」把天文獎頒給徐遐生，以肯定他對理論天文學的貢獻。



劉兆漢院士是太空科學國際知名的科學家，曾任職美國 UIUC，90 年代回臺灣之後除領導臺灣太空計劃(衛星之類的大型計劃)，另外也投入全球變遷的研究，劉院士擔任過中央大學校長及中研院副院長。「溫良恭儉讓」五字，最能精準描述劉院士的人格特質。他做任何事情必定先「想得周全以後再走下一步」，謀定而後動。「目標確定，仔細規劃，慢慢經營」是他的不二法門，驗諸於中大校務推動、個人學術研究，皆有所成。更常勉勵青年學子，不要只侷限於自我的學門，應廣泛涉獵，以實力來展現自信，並以「有容乃大」共勉之。

### "科學家生涯中研究方向的改變"

徐遐生院士

在天文物理的研究領域提供我有關於自然界精彩地充滿令人興奮的神秘工作並且有益我深切地用不同尺度去洞察宇宙物理間的關係。然而，這個主題少有實際上的運用。但拜 21 世紀面臨的兩大挑戰—氣候異常及能源危機所賜，原本在我寬廣地天文物理各分支領域的訓練中，仍有利於我後半生從理論天文物理轉行成為能源科學家(工程師)。所以我將用兩個個人的興趣：生質燃料及鎢鹽反應爐系統，來闡述我今天演講的主題。

### 福衛 3 號-----最精準的太空溫度計

劉兆漢院士

備受國際矚目的福爾摩沙衛星三號，終於克服萬難，在台灣時間 2006 年四月十五日上午九點四十分順利升空。我今天所要談的是"最精準的太空溫度計----福衛三號的故事"。這是一個有關於人造衛星的任務，在台灣也是由我研發及執行的。這是物理學中的創新應用，主要是監測大氣層之上的變化。6 個衛星作出了重大貢獻，有效彌補過去缺乏廣闊海洋和兩極地區氣象觀測資料，提高全球對天氣預報和氣候監測能力。特別的是，我將討論它可以如何幫助我們預測颱風路徑及有關極端天氣的情況。另外還將提到一個由台灣和美國政府機構共同規畫的計劃。

## "Meet the Scientist" - Academicians Share Their Experiences



Prof. Chu obtained a Ph.D. of Economics of the University of Michigan in 29 years old, and became the youngest Academician of Academia Sinica in 43 years old. In 2003, he was awarded the Presidential Science Award, and became the youngest chairman of the Chung-Hua Institution for Economic Research in 53 years old. He is now the Minister without Portfolio of Executive Yuan and the Chairman of the National Science Council. In addition to the extraordinary achievements in the academic field, he is good at "Kung Fu". He has studied tai chi for 33 years, and his "Kung Fu" is unfathomable.

He is also an Academician who concerned a lot in the school education, for three consecutive years since 2007, respectively to teach a semester of social science classes in the high school located in the northern, central and southern of Taiwan, in order to guide high school students into the world of the humanities and social sciences.



Prof. Shu is an internationally renowned theoretical astrophysicist. Expertise to the birth of planet; he is recognized as one of the world's leading astrophysicists. In particular, the Eddy current shape galaxy (spiral galaxy) formation and star formation are two theories which obtain a high academic honor. Frank H. Shu, is also a few scholar who was elected as the Academician of U.S. National Academy of Sciences (1987), of the Academia Sinica (1990), of the National Arts Academy of Sciences (1992), the three Academician honor at the same time.

In 2005, the oldest school in the Netherlands--- the University of Leiden Observatory named a newly discovered asteroid as Frank H. Shu. In 2009, he received the Astronomy Award of "The Shaw Prize", which is well known as Asian Nobel Prize, to honor him about the contribution and achievement to the Astronomy.



Prof. Liu is a radio scientist and an international leader in solar terrestrial physics and global change research. He pioneered the versatile and inexpensive technology known as Computerized Ionospheric Tomography for space weather research. He is one of the prime movers behind the development of satellite constellations such as FORMOSAT-2/COSMIC for collecting climate and weather data applying the GPS Radio Occultation technique. Since the mid-90's, Prof. Liu led a group of scientists with different disciplinary background to carry out global change research in Taiwan and established Taiwan as a regional leader in this field internationally. He is the Chairman of the Southeast Asia Regional Center for START (SARCS) which coordinates the international global change research for the ten Southeast Asia countries.

### "Changes in Research Direction During a Scientist's Career." Prof. Shu

Research at the frontiers of astrophysics is wonderfully exciting in the surprises that it can offer about the mysterious workings of the natural world and deeply rewarding in the insights it can bring concerning the inter---relationships of the physical universe at its smallest and largest scales. However, rarely does one associate practical utility with the subject. Yet, precisely because many of the central challenges regarding the two grand challenges of the twenty---first century - climate disruption and the energy crisis - involve a fundamental understanding of complex systems, a career spent broadly in several subfields of astrophysics has proven to be advantageous training for this speaker's late---career transformation from theoretical astrophysics to energy scientist/engineer. I shall illustrate this theme in two areas of special personal interest: the high---throughput production of biofuels and the transformative technology represented by molten salt breeder reactors.

### " Thermometer in the Sky"

Prof. Liu

The title of my talk is " A Thermometer in the Sky – the Story of FORMOSAT-3 / COSMIC-I". This is about a satellite mission that I helped to develop and implement in Taiwan. It is an innovative application of basic principles in physics for monitoring the upper atmosphere. The six micro-satellite constellation has made significant contributions worldwide improving our weather forecasting and climate monitoring capabilities. In particular, I will discuss how it can help us to predict typhoon tracks and related extreme weather conditions. A follow-on mission planned together by Taiwan and US agencies will also be discussed.