

# Sir Charles Kao - The Man who Shrank the World with Light

Charles Kao was born in Shanghai in 1933. He was a Chinese-born Hong Kong, American and British electrical engineer and physicist who pioneered in the development and use of fibre optics in telecommunications. Charles' work used a single mode dielectric (glass) optical fibre waveguide for long distance communications at a time when the losses of the best available glasses made the idea seem impossible. The idea was in competition with the technology of Long-haul Microwave Waveguide, which was being developed at several laboratories around the world.

He died on 23 September 2018 at the age of 84 having suffered with Alzheimer's Disease since 2004.

## Summary of Sir Charles' career

- 1957 Obtained a BSc in electrical engineering from Woolwich Polytechnic. Joined STC North Woolwich in the Microwave Division
- 1959 Joined STL Harlow**
- 1965 Awarded a PhD in electrical engineering at UCL, London
- 1966 Seminal paper published, co-authored with George Hockham: Dielectric-fibre surface waveguides for optical frequencies**
- 1970 Professor of Electronics at Chinese University of Hong Kong (CUHK)
- 1974 Joined ITT Roanoke, USA, eventually becoming Director of Engineering for ITT's Electro-optical Products Division
- 1987 Appointed Chancellor of CUHK
- 1996 On retirement becomes Honorary Professor of Engineering CUHK
- 2009 Awarded the Nobel Laureate for Physics
- 2010 Knighted in the Queen's birthday honours. Awarded a DSc (Hon) by UCL
- 2010 Founds the Charles K. Kao Foundation for Alzheimer's Disease



The iconic photograph of Charles in his lab at STL in 1966



George Hockham and Charles Kao at the 2006 QCC dinner



A reunion of the old optical team in 2002: Jim Titchmarsh, George Cannel, John Irven, Charles Kao, George Hockham, Charlie Sandbank, Phil Black, Gary Sapsford, Robin Thompson, Simon Laurence, Brian Prosser, Ron Lomax



Charles and Gwen Kao with the Nobel Prize medal



Souvenir Hong Kong stamp, issued to commemorate Charles Kao's 2009 Nobel Prize in Physics

## Local recognition

Charles Kao's achievements at STL have been celebrated in several ways in Harlow.

The Kao Hockham Enterprise Hub in Edinburgh Way was converted from STC's Great Eastern House and is home to many businesses, especially those in the early incubation phase.



The Sir Charles Kao University Technical College was focussed on 14 -19 year old students with science, technology and engineering aspirations



A blue plaque sits in the Water gardens at The High, Harlow's town centre.



Most recently, and perhaps most significantly, the old STL site has been redeveloped as part of Harlow Enterprise Zone and renamed Kao Park.

Within it will be a series of data centres named Kao Data. They will form one of the largest data centre sites outside of the USA.



## A poem written by Richard Epworth

Kao, Kow, Gau, Ko  
Ways to pronounce the name of  
Charles,  
Or the "Charlie" who I know.



It doesn't seem too grand to say:  
I loved this man.  
For he gave me much,  
I'll always be a loyal fan.

A lifelong career for a start.  
Filled with excitement.  
A path with purpose, and with heart.  
For this I owe a debt of gratitude  
For gifts of friendship, opportunity, Encouragement,  
And for enthusiasm which he imbued.

But for humanity he did much more  
He changed the way our world Communicates,  
How we move information from man to man.  
Like the Wheel's invention long before.  
By reducing friction, and increasing the speed  
(i.e. reducing attenuation, increasing bandwidth)  
Fibre responded to mans' latest, growing need.

Charles was a Little man with a Big heart and a Giant vision.  
Through modesty, he realised that success could only come  
If he could sell his vision to the wider world,  
And that became his fervent mission.

So he embarked upon a crusade,  
To enlighten key labs in France, Japan, the USA.  
Travelled far, and generously shared,  
His ideas and material with science minds,  
Who otherwise, would not have cared.

Some, may in their measly way  
Say of his great vision:  
"It would have happened anyway".  
But I recall how vehemently it was opposed  
By the experts, with unenlightened plans less bold.

Charles with clever colleague George did toil,  
Proved fibre failings were not fundamental  
And that vast improvement had potential.  
The competing Microwave solution then went off the boil.

Even I thought the vision rather optimistic  
Yet, from the very start, He did see  
That optical fibre would in time,  
Span the globe and cross the sea.

The clearest glass of the day  
Used to be made from sand.  
Fibre loss had to fall,  
And now great minds lent a hand.  
The purest of chemicals were turned into glass,  
Now clearer than the clearest air on this earth,

So for hundreds of miles light could now freely pass.

Information became the cheapest commodity to transport.  
Optical fibre has "annihilated distance", began the retort.  
No more long distance calls, made brief by cost,  
Made awkward, by satellite induced delay,  
Intimacy lost,  
Quite a different price to pay.

Now much time has passed  
Charles' pioneering vision seen to last.  
And he receives his greatest accolade  
A Nobel Prize for Physics,  
The great award is made.

When young and playful  
He like many bright boys  
Found fire and explosives  
Were his formative toys.

Alfred Nobel was one of that gang,  
For he invented dynamite  
For that very big Bang!

I think of Charles he would be proud  
Though his gift was not so loud  
For our Charles with the Kao name  
Always was a modest man  
Never courting money of fame.

What if Charles' obsession with fibre had not been?  
Long Haul Microwave Waveguide  
Would likely now have been the scene.  
Its constraints would soon be met  
There would now be no world wide web,  
No internet!

The world would be a different place.  
Greater separation between nation, and race.  
Perhaps fibre will be good for humanity,  
Bringing us closer to a shared responsibility  
For climate and for peace.  
Alas technology can only play a part  
It is not enough for Humanity to speak,  
It must also listen to its heart.

It is often said that as we age,  
We are left with just our memories  
As we move towards the final page.  
Ah, if only that were always true  
For those whose past contains rich stories.  
For some, the brain begins to lose its glue  
And the man who shrank the world with light  
Moves slowly into darkness, towards the night.

Charles Kao: A Little man with a  
Big heart and a Giant vision