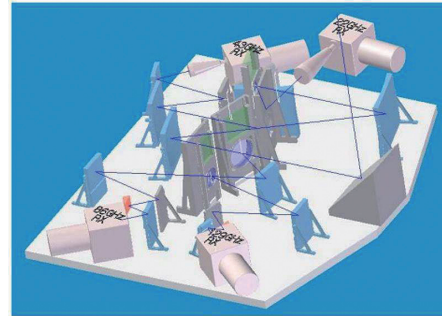


I . Technicality & Patent Information

Technical Summary

<Technical Field>

- Multi-frequency millimeter wave VLBI(Very Long Baseline Interferometry) observing system which is able to simultaneously observe the bands of 22GHz, 43GHz, 86GHz and 129GHz which are frequencies for radio astronomy observation and method for designing circuit of quasi-optical system



<Technical Characteristics>

- A technology for correcting any deformation of space radios of high frequency when they pass through atmosphere
- An observing system which is able to simultaneously observe the bands of 22GHz, 43GHz, 86GHz and 129GHz
- Any deformation of 43GHz, 86GHz and 129GHz signals, which are millimeter waves, can be corrected using a 22GHz signal delay information which relatively is a low frequency, passes through the atmosphere of the earth

<Technical Configuration>

- The quasi-optical system includes a 45° flat mirror which allows the beam from an antenna to input into the inside of a receiver, a low pass filter which has different transmission and reflection properties for splitting frequencies, and a several of ellipsoidal mirrors for focusing and transmitting the splitted beams and for delivering beam to each receiver, and a flat mirror.
- The circuit is configured to minimize any losses of beams which may occur when incident beam reflects or transmits, using a several of low pass filters (LPF) having different frequency bands

Development Background & Problem solution

<Development Background>

- The phase delay by troposphere limits an imaging capability of space radios during a millimeter wave VLBI observation while lower the sensitivity of a receiver system
- To this end, it urgently needs to develop a system which is able to correct any phase delay which may occur due to troposphere in the millimeter VLBI observation

<Problem solution>

- The present technology is directed to a method for designing a circuit of a quasi-optical system, which is able to observe and correct any phase delay of cosmic radio signals while reducing any losses of electric power

Application & Applicable Fields

- A receiver system facility for a radio astronomy study
- The building of an artificial satellite and deep space communication system

Technical Competitiveness & Excellence

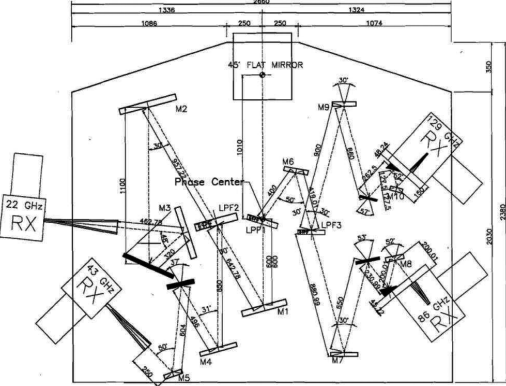
<Difference in Technologies>

- A technology which has succeeded, for the first time in the world, in the correction of a phase delay of high frequency such millimeter and sub-millimeter waves

<Superiority>

- The receiver system, which was able to simultaneously observe 4 channels, was mounted on the KVN Yonsei radio telescope and succeeded, for the first time in the world, in simultaneously observing cosmic radio waves from the Orion-KL
- The effects same as in the radio telescope with a diameter of 500km were lately obtained with the aid of KVN(Korean VLBI Network) to which three radio telescopes are connected, thus succeeding, for the first time in the world, in simultaneously observing 4 cosmic radio waves from the galactic nucleus

Core Patent

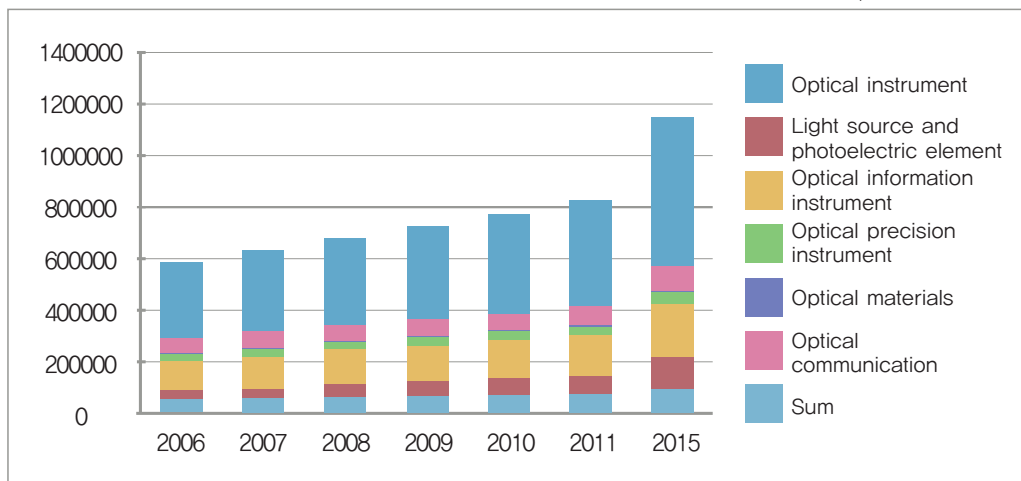
Country	Application No.	Filing date	Registration No.	Registration date
KR	2008-0118346	November 26, 2008	0990741	October 22, 2010
Title of Invention				
Multi-frequency millimeter-wave VLBI observing and receiving system and method for designing circuit of quasi-optical system for the same				
Core contents				
 <p>The present invention relates to a multi-frequency millimeter wave VLBI observing and receiving system and a method for designing a circuit of a quasi-optical system for the same. The system may include a plurality of low pass filter (LPF) for splitting a space radio signal beam (hereinafter referred to as "beam"), which comes in through troposphere, into a plurality of bands, and an offset elliptical surface mirror and a plane mirror, wherein the beam coming in from a spot in the celestial body inputs into the inside of the receiver through the 45° plane mirror, thus splitting the frequency-split beam into frequencies using a plurality of the low pass filters (LPF) having different bandwidths and the mirror, and the frequency-split beams transmit to the optical receiver having corresponding frequency bands through a plurality of mirrors, thus correcting the phase shift of electromagnetic wave by simultaneously observing the bands of 22GHz, 43GHz, 86GHz and 129GHz which are in general used for the purpose of radio astronomy observation</p>				

II. Marketability & Feasibility

Market situations & Prospects

Market Scale of Optical Industry and Prospect

(unit: million dollars)



Source: actual condition research on industrial competitiveness in optical instrument and goods business in 2012 KIET December 26, 2012

- The world market scale of the optical industry was about 290 billion dollars in 2006, about 400 billion dollars in 2011, which means a continuous growth, and it is expected that such a market scale may reach about 570 billion dollars in 2015
- The annual average increase rate from 2006 to 2011 was about 7.1%, which shows a trend of a high increase rate
- Thanks to an increase in the needs with respect to an optical communication and an optical information device in China, it is expected that the market growth rate in Asia will continue to increase

Feasibility Requirements

- No other issues

III. Technology Transfer Conditions & Researcher Information

Technology Transfer Condition

Technology Transfer Scopes	Patent	Multi-frequency millimeter-wave VLBI observing and receiving system and method for designing circuit of quasi-optical system for the same(KR No. 10-0990741)
		Multi-frequency millimeter-wave VLBI receiving system and method of designing quasi-optical system for the same(US 8,053,720)
	Knowhow	- A quasi-optical system designing technology which is able to simultaneously observing multichannel (2, 3, 4, 5 channels and more channels) signals including 4 channels. - A technology for designing elliptical surface mirror and feedhorn which belong to a quasi-optical system
	Others	Technical data, etc.
Technology Transfer Conditions	Transfer type	<input type="checkbox"/> Sale (assignment) <input type="checkbox"/> Exclusive License <input checked="" type="checkbox"/> Non-exclusive License
	Royalty type	<input type="checkbox"/> Lump sum payment <input type="checkbox"/> Running Royalty <input checked="" type="checkbox"/> Initial+Running <input type="checkbox"/> Others ()
	Royalty	To be separately consulted

Researcher information

Researcher	Name/Dept.	Han, Seog-Tae(Radio technology development group) / KASI	
	Contacts	T. 042-865-3283	E-mail. sthan@kasi.re.kr

Contact Information

Person in charge	Name/Dept.	Lee, Donghyun/Performance promotion team / KASI	
	Contacts	T. 042-865-3350	E-mail. ldh@kasi.re.kr