

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Satellite Communications and Navigation Technology (3)

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SCIENTIFIC RESEARCH AND GLOBAL NAVIGATION SATELLITE SYSTEMS - PRESENT AND
FUTURE TRENDS

Abstract

Two Global Navigation Satellite Systems (GNSS) are presently in operation, these are the American GPS and the Russian GLONASS. In the near future the European Galileo system will complement these already existing constellations, together with the Chinese and the Indian GNSS. Although the main applications of these systems are currently essentially civilian and military, they can also be used, to different extents, to carry out scientific research in a wide variety of domains such as, for example: Earth sciences (geodesy, geophysics, oceanography, meteorology, space-weather), metrology (measurement and global distribution of time and frequency, clocks synchronization, definition and maintenance of reference frames), and fundamental physics (verification and utilization of the fundamental laws of quantum and relativistic mechanics in the framework of the satellite constellation). Thus, GNSS can be seen as providing a new, genuine, multi-disciplinary scientific application to different scientific communities and will most probably benefit from these communities with respect to its future evolution. In the present paper it is foreseen that GNSS will evolve towards the use of quantum information and quantum communications in the systems measuring time in future relativistic positioning constellations. This would most certainly contribute to make quantum and relativistic mechanics, key physical theories, at the heart of space activities during the XXIst century.