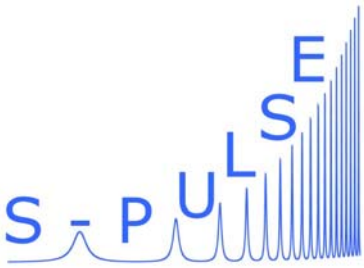

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NEWS LETTER
on Superconducting Electronics

S-PULSE
Shrink-Path of Ultra-Low Power Superconducting Electronics
www.S-PULSE.eu

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THE 2010 EUROPEAN ROADMAP ON SUPERCONDUCTIVE ELECTRONICS – STATUS AND PERSPECTIVES

by Hannes TOEPFER

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Superconductive electronics is of potential impact in a variety of fields which determine the contemporary way of life as well as its quality:

- Resources and Environment,
- Health Care,
- Security and Mobility,
- Information and Communication Technology,
- Improved Production Processes,
- Standardization and Measurement.

The special advantage consists of the unique combination of very high operation speed with low energy consumption. This is in contrast to other existing information-processing technologies. The demonstrated energy consumption of about 0.1µW per gate at 100GHz can be further reduced by a factor of 100. Solutions will be presented at the upcoming Applied Superconductivity Conference in August 2010.

Within the European project S-PULSE, a Roadmap for Superconductive Electronics in Europe has been established by a consortium of leading scientists in the field from 15 partner sites.

Besides a thorough assessment of the current state-of-the art, it represents an elaborated proposal for immediate action in order to allow the conversion of the potential offered by this technology into benefits for European society and industry.

Superconductive Electronics for Europe – Theses

Superconductivity already plays a very important role in scientific measurement techniques and ultra-sensitive detectors. In the future, a growing number of superconductor applications in science and industry can be expected.

The European expertise in basic science concerning superconductivity and in material science is strong. Also in the area of applying superconductivity in high energy technology, health care, prospecting, standardization and measurement, Europe is still competitive. But with the current level of support, Europe is in danger to loose ground in the areas of health care and prospecting relative to the competitors in the USA and Japan.

In the important area of information and communication technology, Europe has already lost ground and urgently needs to close the gap to the USA and Japan. These countries have continuously maintained research programs for exploiting the unique features of Superconductive Electronics.

In Europe, the FLUXONICS platform – implemented by means of the European Community - aims at bringing together actors from industry, small and medium-size enterprise, and research organizations such as universities in the field of superconductive electronics

The main challenges for turning the potential offered by superconductive electronics into positive effects for European society and industry can be addressed by focusing efforts on four proposed research fields.

Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

STRENGTHS

- well-structured research community, covering all necessary branches
- organization by a society (FLUXONICS),
- availability of a certified fabrication site for integrated circuits as well as of a dedicated design center for integrated circuits and sensors

WEAKNESSES

- sporadic research support,
- fragmented, often uncoordinated research activities,
- scarce recognition of the potential of superconductive electronics for European society

OPPORTUNITIES

- development of superconductive electronics enables new innovations in the fields of
  > Health Care,
  > Security and Mobility,
  > Information and Communication Technology,
  > Improved Production Processes,
  > Standardization and Measurement.

THREADS

- national groups are in danger of running below critical mass
- continuation of fragmented research actions prevents a breakthrough of this technology
- danger of losing ground in comparison with USA and Japan

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