Partnering Opportunity

Profile Status: Published

Research & Development Request

Horizon 2020: FET-Open Challenging Current Thinking – consortium seeks partner in the area of laser physics and molecular quantum control

Summary

A Bulgarian research centre will act as Coordinator for a project under FET Open programme in the field of propulsion employing the quantum technology. The consortium seeks at least one more partner outside Bulgaria and UK. The type of partner could be an SME, centres or universities with experience in R&D in laser physics and molecular quantum control. The role of the partner will be to lead the experimental validation stage and provide expert advice during the theoretical and demo stages.

Creation Date	15 November 2019
Last Update	15 November 2019
Expiration Date	31 March 2020
Reference	RDBG20191018001
Public Link	https://een.ec.europa.eu/tools/services/PRO/Profile/Detail/5bd72432-9887-4d41-894d-ef115fd32014

Details

Description

Cutting edge quantum technologies are currently being used in the areas of communications, computing, and sensing. This project aims to extend the application of quantum technology in the field of propulsion. A quantum drive would not interact with the environment chemically or radioactively. It should work in any media, such as water, air, and vacuum.

The proposed Q-drive relies on the unique nitrogen inversion of ammonia (NH3) - a feature that was previously utilised in the first atomic clocks (1949) and the masers (1953). The nitrogen inversion is a quantum tunnelling process where the NH3 gas molecules spontaneously change their shape billions of times per second at the speed of light. A relatively small container filled with ammonia can contain ~1020 of these molecular pistons. Besides, the NH3 molecules are

polar and can be organised with externally applied electric fields and lasers. The work cycles of every molecular piston would be as follows: orient-invert-orient-invert. The intent is to orient the quantum tunnelling of the relatively heavy nitrogen in a fixed predominant direction. The oriented pistons would affect the molecular collisions creating pressure bias and a resultant propulsive force at the macroscale. Up to 10 TW of inversion power can be extracted from 1m3 of ammonia gas at atmospheric pressure.

Recent proof-of-concept experiments (2018) with ammonia in an electric field demonstrate the translational and rotational motion of a 1-kg container. This project aims to optimise the efficiency of the Q-drive by evaluating theoretically alternative resonant and non-resonant orientation approaches for the NH3 molecules, which do not prohibit the quantum tunnelling process. The optimal solutions will be tested in laboratory conditions. Depending on the complexity of the final solution, a pilot demo test may be conducted on a scaled-down ship model typically used for propeller design.
The consortium seeks a partner to lead the experimental validation stage and provide expert advice during the theoretical and demo stages.

The proposal is being prepared for the next FET OPEN call (Horizon 2020: FET-Open Challenging Current Thinking; 13 May 2020) by an international consortium represented by an academic institution,a research centre and small industries that combine basic and applied research.

EOI deadline: 31 March 2020
Call deadline: 13 May 2020
Project duration:

Advantages and Innovations

The proposed Q-drive method is environmentally safe. It does not rely on chemical or radioactive processes.

The Q-drive method has has no analogue with a wide range of applications such as the propulsion of ground, marine, air and space vehicles.

Stage of Development

Under development/lab tested

IPR Status

Patent(s) applied for but not yet granted

Comment Regarding IPR status

The EPO search report did not find other propulsion methods based on quantum tunnelling.

Keywords

Technology

02009006	Traction/Propulsion Systems

Market

08005	Other Industrial Products (not elsewhere classified)
09001007	Other transportation

NACE

M.72.1.9	Other research and experimental development on natural sciences and engineering

Network Contact

Issuing Partner

ZACHODNIOPOMORSKI UNIWERSYTET TECHNOLOGICZNY W SZCZECINIE

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Open for EOI : Yes

Client

Type and Size of Organisation Behind the Profile

R&D Institution

Year Established

0

Already Engaged in Trans-National Cooperation

No.

Languages Spoken

English

Client Country

Bulgaria

Partner Sought

Type and Role of Partner Sought

The type of partner could be SME, centres or Universities with experience in R&D in laser physics and molecular quantum control. The role of the partner will be to lead the experimental validation stage and provide expert advice during the theoretical and demo stages.

Type and Size of Partner Sought

SME 11-50,University,R&D Institution

Type of Partnership Considered

Research cooperation agreement

Program - Call

Framework Program

Future and Emerging Technologies

Call title and identifier

Horizon 2020

FETOPEN-01-2018-2019-2020

FET-Open Challenging Current Thinking

Coordinator Required

No

Deadline for EOI

31 Mar 2020

Deadline of the Call

13 May 2020