

AIDAInnova - WP10

WP on Horizontal Mechanics

Research Objective:

- Microelectronics Cooling & Integrated ultralight support
- Tasks

1. Engineering cooling substrate (CERN, CSEM, CSIC, INFN, MPG, Industry)
2. Micro connectivity (LPNHE, LAPP, FBK)
3. Supercritical fluids as refrigerants (CERN, UNIMAN, NTNU)
4. Mechanical characterisation (UOXF)

Synergy with WP5

Coordinators

- Paolo Petagna (CERN), Marcel Vos (CSIC-IFIC)

INFN (coord. F. Palla): Pisa and Perugia

Partecipazione INFN

Sezioni:

- Pisa, Perugia - personale che renderà individuato

Attività

- Task1: micro-channel cooling, strutture di supporto leggere (“tralicci” à la ALICE) e additive manufacturing, back-to-chip silicon buried channels
 - Possibile coinvolgimento in task “laterali” (ad es. interconnessioni (Task 2) o fluidi con nano materiali (Task 3))

Sinergie

- IDEA (FCC-ee, CepC)
- Belle-II upgrade
- CMS upgrade
- CoolFPGA

Budget

- 20 kE + 5 kE overheads
 - Assegno di ricerca a Perugia (cofinanziato - fondi individuati) ≥ 2022
 - Assegno di ricerca a Pisa (cofinanziato - fondi da trovare) ≥ 2023

AIDAnova WP10 Mechanics
WP coordinators: P. Petagna, M. Vos

Full costs budget per Task

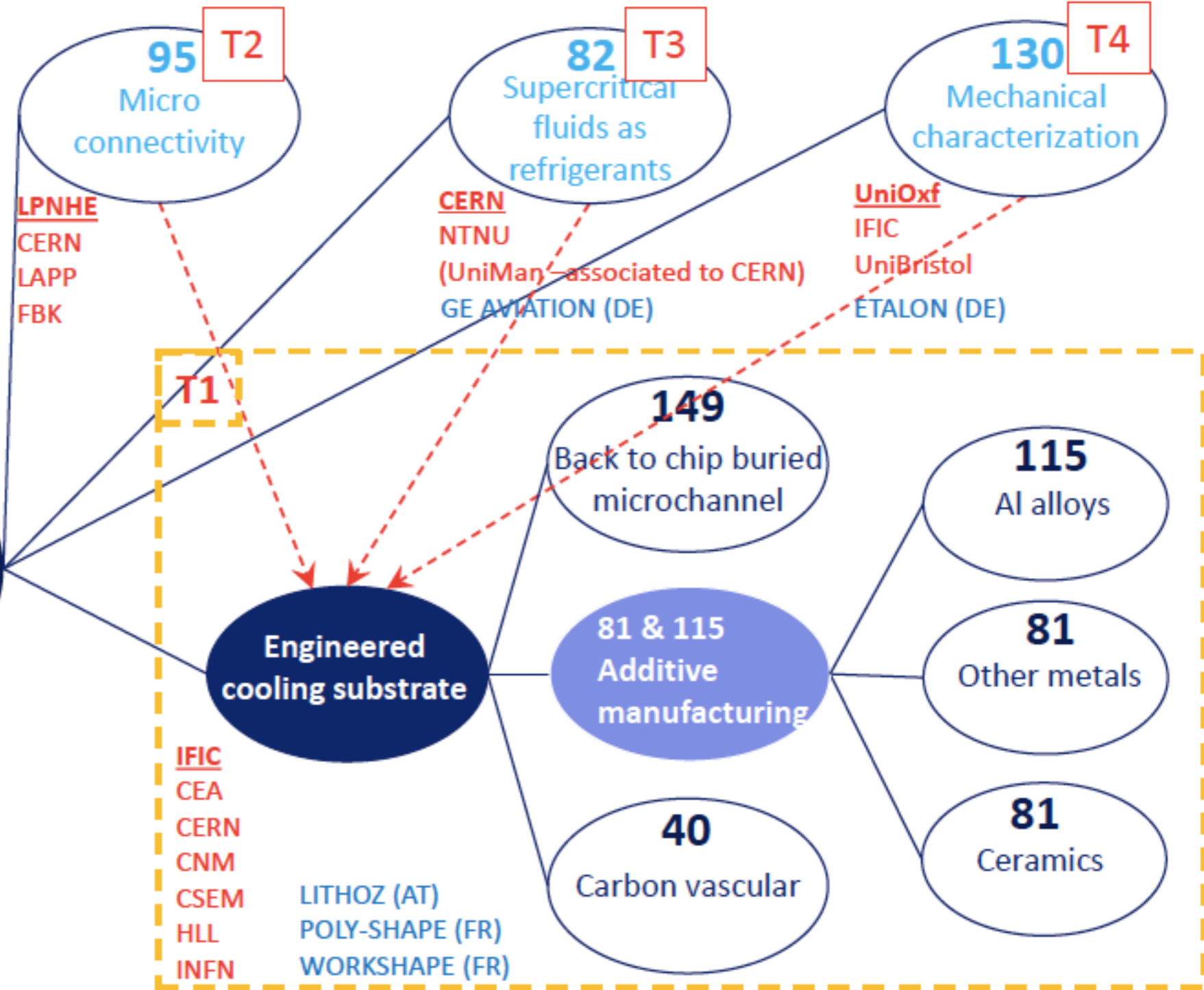
Beneficiary short name	Person-months	Monthly personnel cost	Personnel costs	Travel	Equipment and consumables	Other direct costs	Sub-contracting	Material direct costs	Total direct costs	EC requested funding (without overheads)	EC requested funding (including overheads)
Task 10.2	Engineering cooling substrate										
INFN	12,0	5.000,00	60.000,00	1.000,00				1.000,00	61.000,00	20.000,00	25.000,00



- 1 Coordination Task
- 4 Technical Tasks
- 14 **Participating Institutes**
- 4 **T-Responsible Institutes**
- 5 Industrial Partners

microelectronics
Cooling &
Integrated
ultralight support

Coordinatori:
Paolo Petagna (CERN),
Marcel Vos (CSIC-IFIC)





T1 is the main Task of the WP: 7 Participating Institutes and 3 Industrial Partners

FOCUS: complementary production methods for advanced electronic cooling integrated in structural design

Lines of research: Ultra light carbon vascular

Additive manufacturing (metals and ceramics)

Back-to-chip silicon buried channels

Deliverables: FUNCTIONAL PROTOTYPES for all complementary lines of research

Industrial Partners: Participation confirmed, role still under discussion



T2 is strictly connected to T1: 4 Participating Institutes

FOCUS: Advanced technologies for micro-channel substrates interconnectivity

Lines of research: 3D printed hydraulic interconnection pieces

Optimized fluidic geometry

Bonding/soldering techniques

Deliverables: FUNCTIONAL PROTOTYPES compatible with the prototypes produced by T1





T3 is a transversal task: 3 Participating Institutes and 1 Industrial Partner

FOCUS: Studies on supercritical fluids as high-performance single phase refrigerants.

(Initial case study: sCO₂ in the 32-45 °C range)

Lines of research: Precision measurements on sCO₂ on dedicated test facilities

Studies on other fluids for different temperatures

Deliverable: REPORT (results and possible technical implementation in detectors)

Industrial Partner: Participation confirmed, role still under discussion

T4 is a transversal task: 3 Participating Institutes and 1 Industrial Partner

FOCUS: Mechanical characterization of ultra-light structures with integrated cooling

Lines of research: Improvement of survey technology on ultra light detector structures

Measurements on prototypes

Deliverables: REPORT (results from mechanical characterizations)

Industrial Partner: Participation under discussion