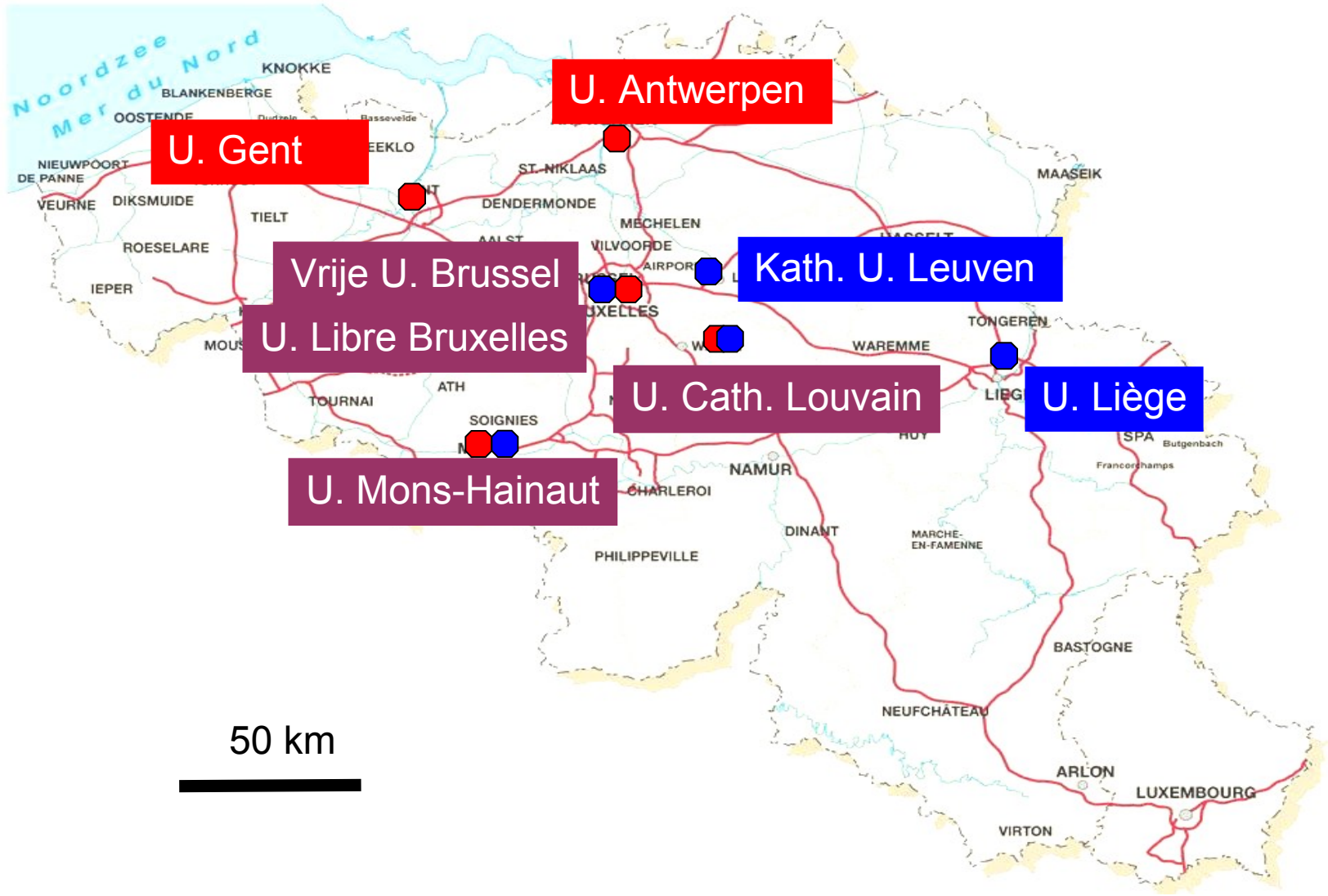


# On the Map : fundamental interactions

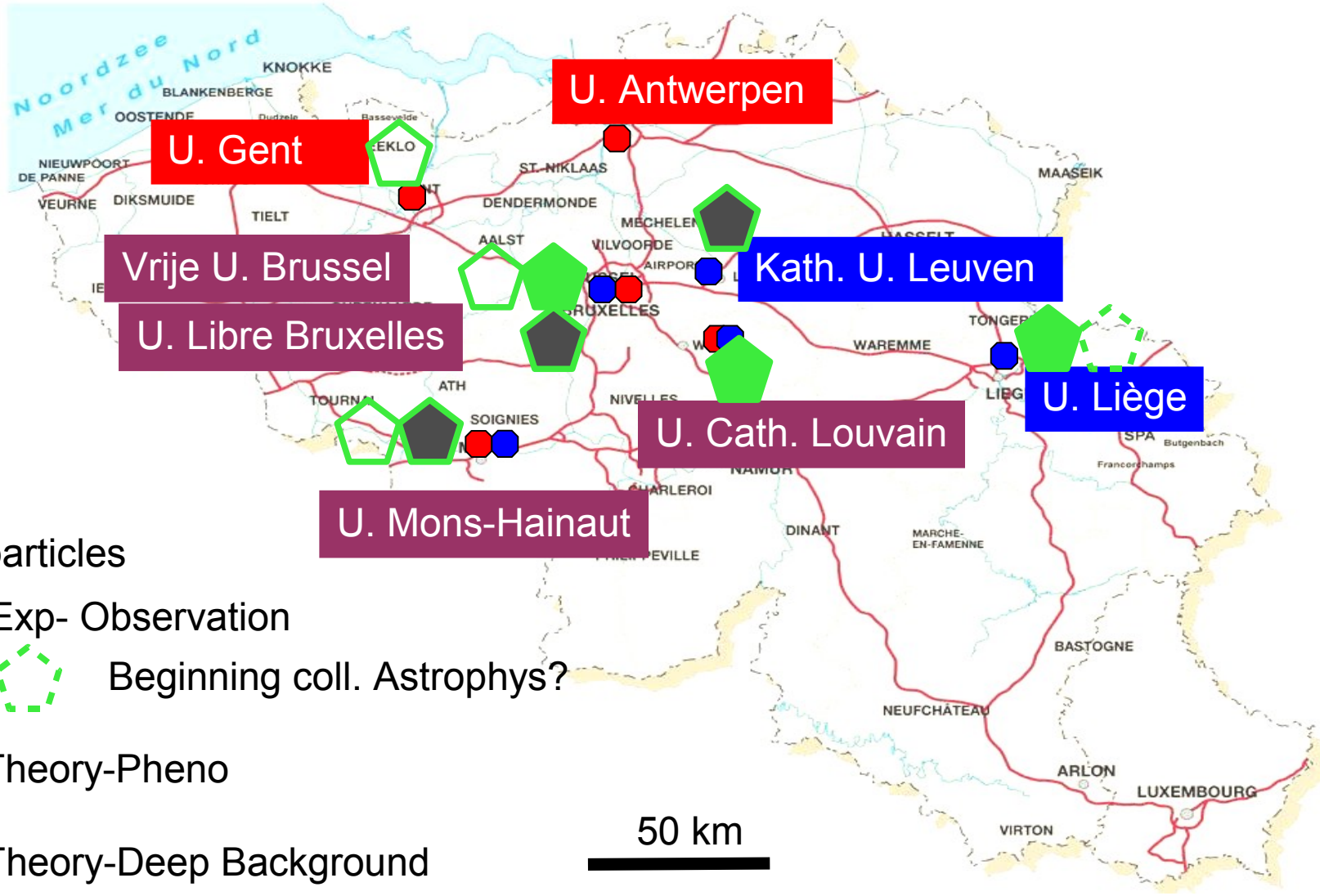
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Interactions



Astroparticles – TH  
EXP  
BOTH

# On the Map : Astroparticles

Interactions  
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Astroparticles – TH

TH  
EXP  
BOTH

Astroparticles

- Exp- Observation
- Beginning coll. Astrophys?
- Theory-Pheno
- Theory-Deep Background

50 km

# Current (or planned) activities

## EXPERIMENT/OBSERVATION:

- **Amanda/Icecube**
- *Some collaboration with Hires (ULB-th) / Telescope Array*
- *Possible collaboration with "Extragalactic astrophysics" group of Ulg?*

## THEORY - DEEP BACKGROUND : KUL, ULB-ThMath, VUB, UMH

- String theory,
- General relativity and variants, Black holes
- Big bang models
- String cosmology

THEORY – PHENO : ULB-th, UCL-th, Ulg



- UCL-th (*JM Gérard, Ch Ringeval, F. Maltoni*)
  - Gravity variants
  - Axions
  - Inflationary models, cosmic strings, Inflaton, CMB implications
- ...
- ULB-th (*JM Frère, P Tinyakov, Th Hambye, M Tytgat and postdocs*)
  - Neutrino physics, extradim, neutrino lensing
  - Dark matter candidates, direct/indirect searches (*FS Ling, E Nezri*)
  - Susy DM, inert doublet, relation between dark matter and B number,
  - High energy cosmic rays,
  - Gravity variants,
  - Models of neutrino production in GRB's (*H Koers*)
- ...
- ULg: (*J Cugnon J-R Cudell, ..*)
  - « Fundamental Interactions in Physics and Astrophysics »,
    - Axions and polarized light from QSS,
    - Quark matter and stars, ,
    - Mirror dark matter and microlensing
    - Collaboration starting with « Extragalactic astrophysics »  
(*J. Surdej and D. Hutsemekers – gravitational lensing*)

# Funding Sources

Interactions

- EU: networks : Strings , Eurotrans,
- French Community : [details below](#)
- Flemish Community : [details below](#)
- Federal Government :
- CERN, ESA,... contributions
  - IAP's (Inter University Attraction Poles): [details below](#)

*Astroparticles – TH*

## French Community:

Fonds de la Recherche Scientifique (FNRS)

Fonds de la Recherche – Industrie et Agriculture (FRIA)

- Mostly individual fellowships, including PhD fellowships, Postdoc\*
- Permanent research positions (accessible to all with Phd Equivalence)

Institut Interuniversitaire des Sciences Nucléaires:

- Main funding for Experiments, including technical staff
- Moving from group-funded to project-funded
- Running costs, (also TH)
- Some Phd Fellowships (flexible), Postdocs\* (TH and experiment)

Universities:

- Academic positions, some running costs,
- extra positions (depends on each university)

Actions de Recherches Concertées

- Impulse funding, through Universities (TH or EXP)

\* : postdoc scheme not adapted to theorists market and practice in our field:  
CV must be submitted long in advance, decision in July

## Flemish Community

### Fonds Wetenschappelijk Onderzoek – Vlaanderen + IIKW + IWT

- Individual fellowships, including PhD fellowships,
- Extended Postdoc\* positions (3X3 years)
- NO Permanent research positions
  
- Main funding for Experiments, including technical staff
- Running costs, (also TH)

### Universities:

- Academic positions, some running costs,
- extra positions (depends on each university)

\* : postdoc scheme not adapted to theorists market and practice in our field:  
CV must be submitted long in advance, decision in July

Federal Funding:

- CERN, ESA contribution
- Spatial research
- **Inter University Attraction Pôles (successive 5-year plans)**

In our field, we have benefitted from IAP V:2002-2006 and VI 2007-2011  
« Fundamental Interactions »

These programs have helped structure the field, provided flexible postdoc positions, and prompt new orientations. (including astroparticles)  
While not involving permanent hirings, they helped in securing academic positions.



All belgian Fundamental interactions groups (TH + EXP) now associated.  
Total funding (over 5 years) : 5 820 k€

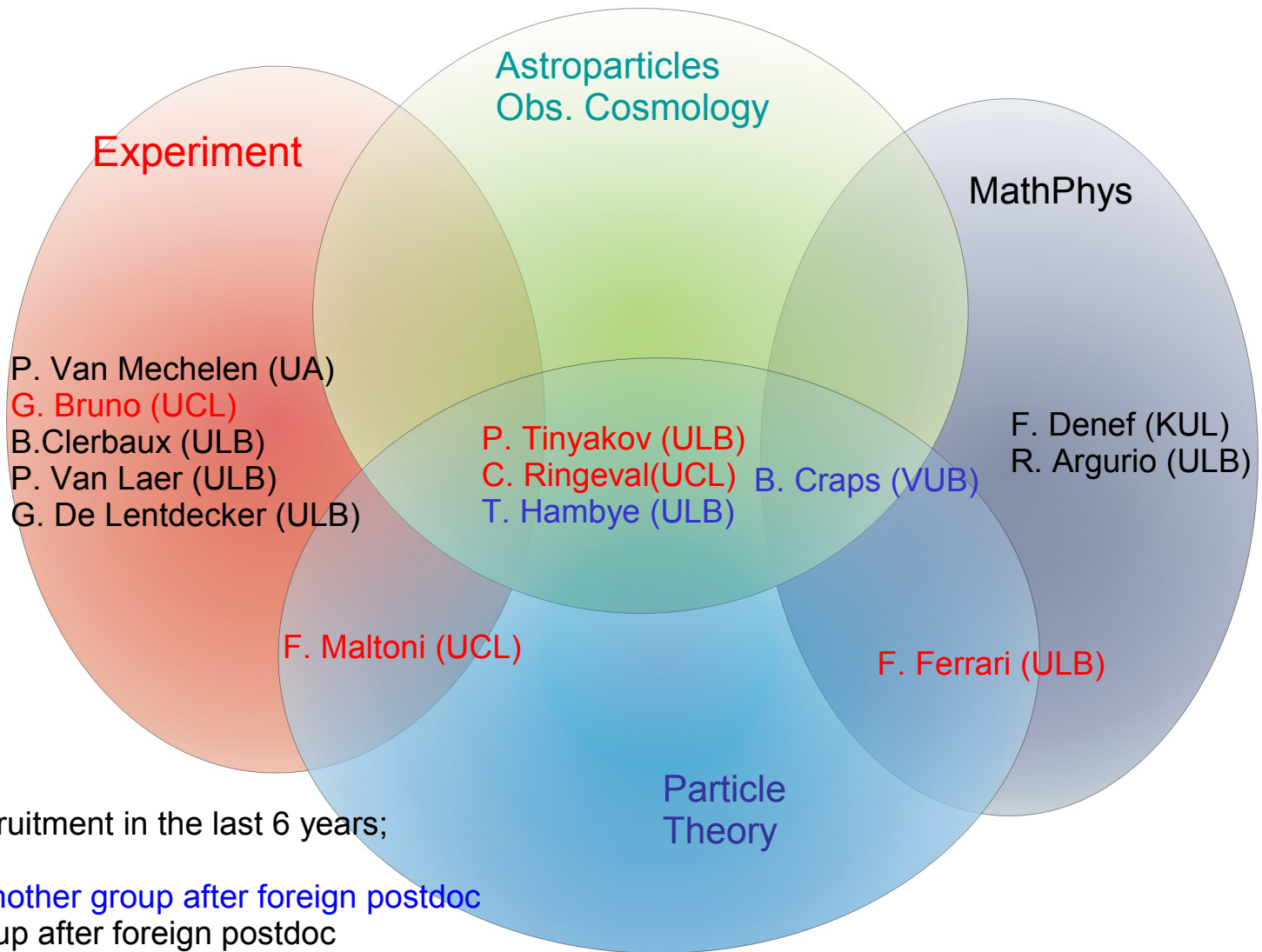
covers approx 2 postdocs/group during 5 years ,  
very flexible, -- can be optimized by transfer to less flexible contracts.

IAP board approves all recruitment, and takes collegial attitude on other matters,  
coordination: jm frere, ULB

This project involves a task force to study  
new possible experiments for belgian groups  
(*meets... today in LLN to discuss neutrino experiments !*)



Astroparticles - TH



Permanent recruitment in the last 6 years;  
 external  
 belgian from another group after foreign postdoc  
 from same group after foreign postdoc

IAP program in endangered by desire for complete splitting of research funding  
-- not clear how regions would spend the money !

## Collaboration with Astrophysics?

- Belgian astrophysics is very successful in exoplanets, star evolution, nuclear astrophysics .... all very far from our interests
- In ULg, high-energy theory and astrophysics now in the same dept, and collaboration could develop further (gravitational lensing)
- Space funding is still untapped at this stage, and may deserve exploration

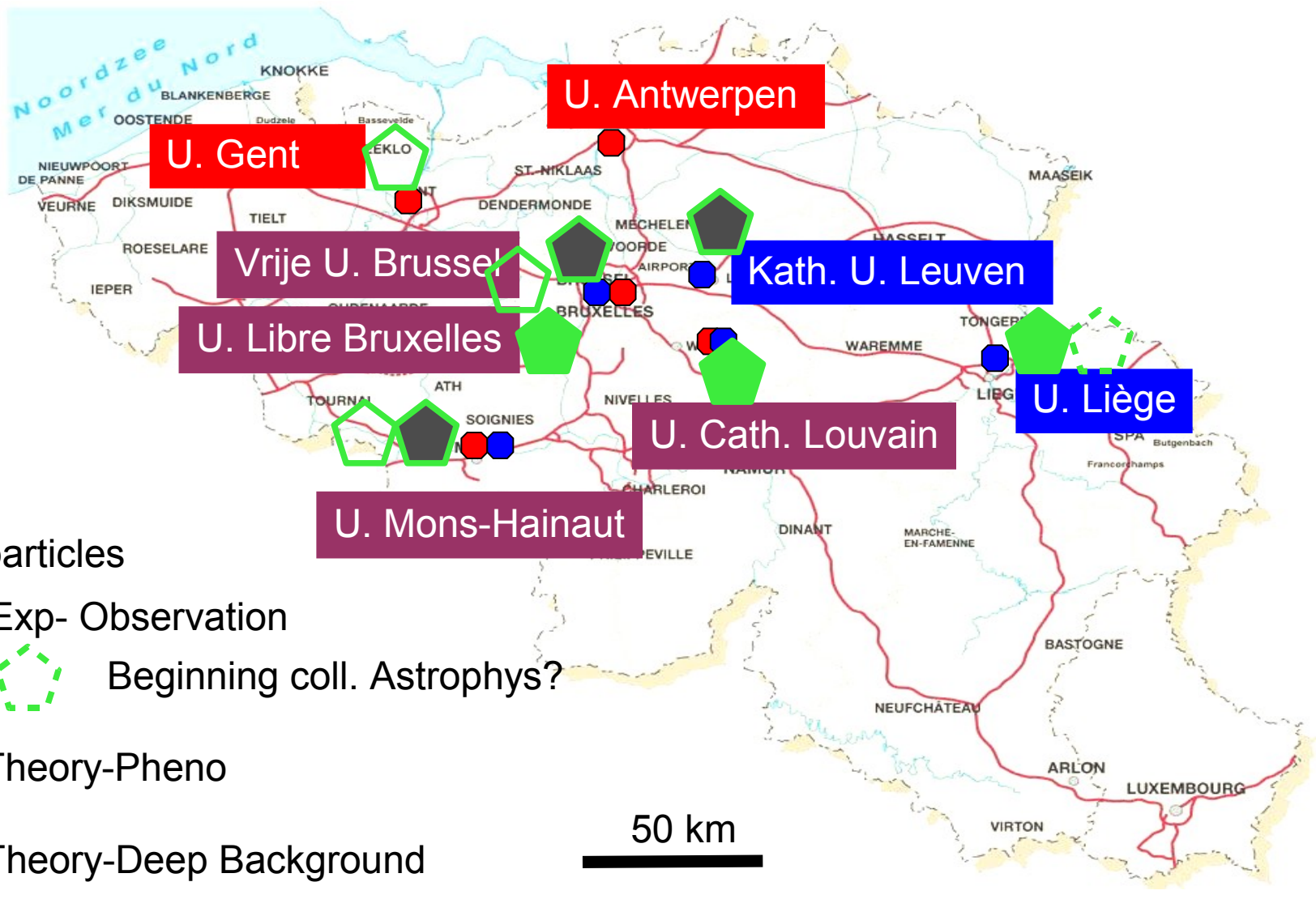
## New AstroParticle Theory groups?

- May develop (see map)

# On the Map : Astroparticles

Interactions .be

Astroparticles – TH



TH  
 EXP  
 BOTH

Astroparticles