



# AVENG<sub>e</sub>



Advances in Very-High Energy Astrophysics  
with Next-Generation Cherenkov Telescopes

## Il contributo italiano ai KSP CTA

A. Stamerra - INAF/OAR



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# Disclaimer

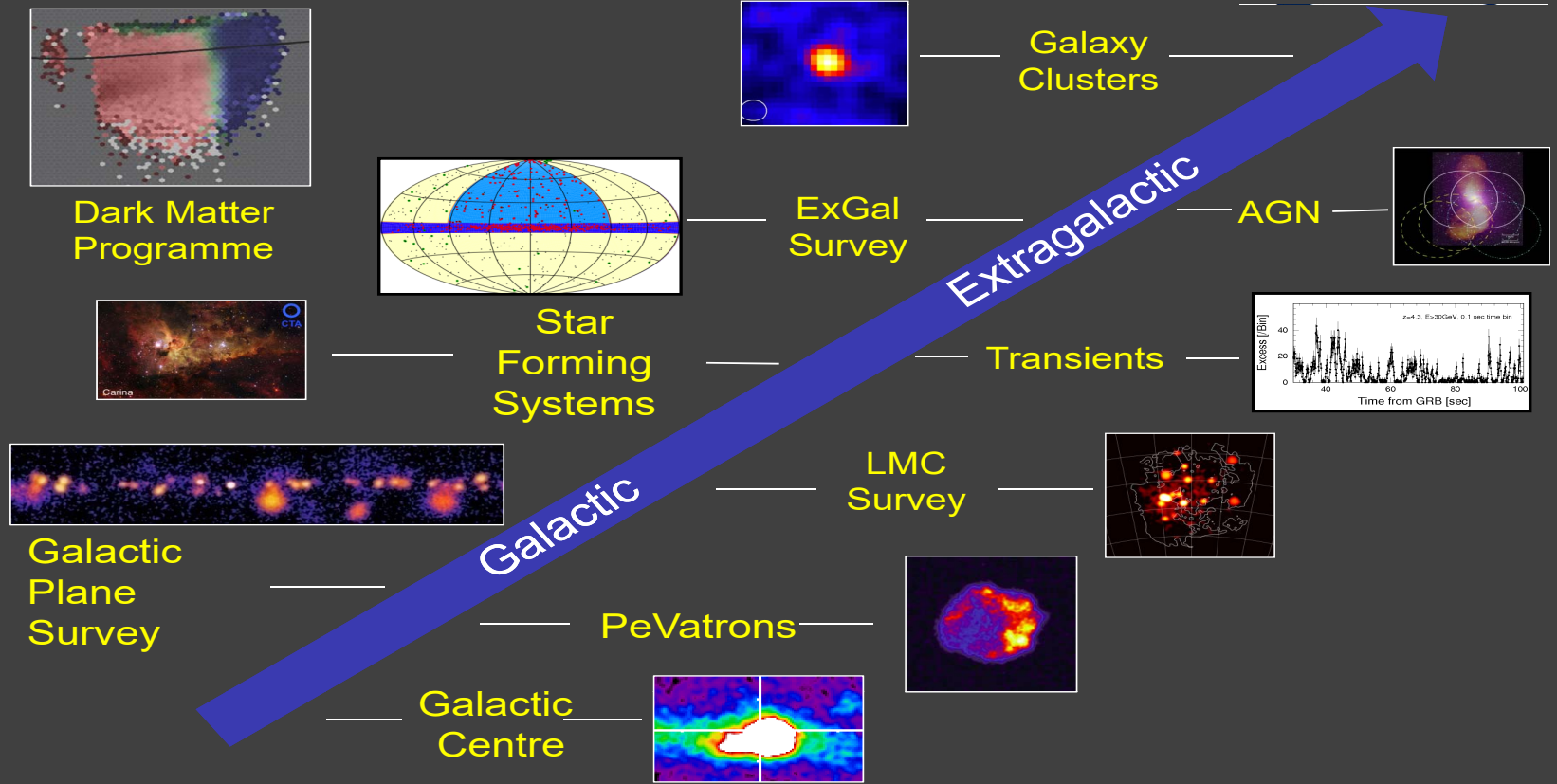
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- Considero questa presentazione un work in progress e da aggiornare, anche durante questo workshop.
- Non sono considerati i gruppi italiani che hanno competenze utili ai KSP CTA, o i cui lavori sono stati usati nei KSP, ma che non hanno partecipato ad attività CTA
  - Da considerare nelle sinergie
- Sono considerate solo le attività legate alla scienza e ai KSP (non sono inclusi i contributi legati ad hardware, sviluppo software, MC, etc.)



# The CTA key-science projects



# The CTA key-science projects



provide legacy data sets and data products

1. Dark Matter Programme
2. Galactic Centre
3. Galactic Plane Survey
4. Large Magellanic Cloud Survey
5. Extragalactic Survey
6. Transients
7. Cosmic-ray PeVatrons
8. Star-forming Systems
9. Active Galactic Nuclei
10. Cluster of Galaxies
11. Beyond Gamma Rays

**Surveys**

**Key objects**



2017 - 2019

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Scritto prima/durante scoperta GW,  
possibile rivelazione controparte  
neutrini e rivelazione emissione GRB

Scritto prima delle scoperte  
breakthrough di LHAASO



Vedi discussione a CTAC/CTAO meeting Granada

[https://indico.cta-observatory.org/event/4497/contributions/39351/attachments/23539/33871/2023\\_04\\_24-TransientRegular-NewKSP-ThStolarczyk.pdf](https://indico.cta-observatory.org/event/4497/contributions/39351/attachments/23539/33871/2023_04_24-TransientRegular-NewKSP-ThStolarczyk.pdf)

2017 - 2019

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Sforzo generalizzato della comunità  
italiana. Es. extrag.survey, AGN,  
transients, dark matter.

Possibile bias personale sulla  
partecipazione ai temi galattici

Theme	Question	Dark Matter Programme	Galactic Centre Survey	Galactic Plane Survey	LMC Survey	Extra-galactic Survey	Transients	Cosmic Ray PeVatrons	Star-forming Systems	Active Galactic Nuclei	Galaxy Clusters
Understanding the Origin and Role of Relativistic Cosmic Particles	1.1 What are the sites of high-energy particle acceleration in the universe?		✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓	✓✓
	1.2 What are the mechanisms for cosmic particle acceleration?		✓	✓	✓		✓✓	✓✓	✓	✓✓	✓
	1.3 What role do accelerated particles play in feedback on star formation and galaxy evolution?			✓		✓			✓✓	✓	✓
Probing Extreme Environments	2.1 What physical processes are at work close to neutron stars and black holes?		✓	✓	✓			✓✓		✓✓	
	2.2 What are the characteristics of relativistic jets, winds and explosions?		✓	✓	✓	✓	✓✓	✓✓		✓✓	
	2.3 How intense are radiation fields and magnetic fields in cosmic voids, and how do these evolve over cosmic time?						✓			✓✓	
Exploring Frontiers in Physics	3.1 What is the nature of Dark Matter? How is it distributed?	✓✓	✓✓		✓						✓
	3.2 Are there quantum gravitational effects on photon propagation?						✓✓	✓		✓✓	
	3.3 Do Axion-like particles exist?					✓	✓			✓✓	

DM non è  
un KSP

# Gli autori del Science Paper

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italiani (~17% sul totale)

Mia statistica:  
Coinvolti in attività scienza+  
HW+SW: >~90%  
Ancora coinvolti oggi: >~70%  
Coinvolti nei PWG scientifici:  
>~50 (~50%)

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 "KSP e partecipazione INAF"  
 Ottobre 2017

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SWG	INAF Scientists	Total	INAF %
Galactic	29	207	~14
Cosmic Rays	11	148	~7
Extra-galactic	21	191	~11
Transients	32	186	~17
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Intensity Interferometry	4	25	~16

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Intensity Interferometry is not a current Key Science Project.



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D. Cauzi<sup>81</sup>, M. Cerutti<sup>82</sup>, F. Chadwick<sup>83</sup>, S. Chetty<sup>84</sup>, R.C.G. Chaves<sup>85</sup>, A. Chen<sup>86</sup>, X. Chen<sup>87</sup>,  
M. Chernyakova<sup>88</sup>, M. Chikawa<sup>89</sup>, A. Christakos<sup>90</sup>, J. Chubb<sup>91</sup>, M. Cidriani<sup>92</sup>, V. Coor<sup>93</sup>,  
S. Colafrancesco<sup>94</sup>, P. Colin<sup>95</sup>, V. Conforti<sup>96</sup>, V. Connaughton<sup>97</sup>, J. Conrad<sup>98</sup>, J.L. Contreras<sup>99</sup>,  
O. Cuevas<sup>100</sup>, P. Cuman<sup>101</sup>, A. D'Al<sup>102</sup>, F. D'Amico<sup>103</sup>, P. D'Avanzo<sup>104</sup>, D. U'Uro<sup>105</sup>, M. Daniel<sup>106</sup>,  
I. Davids<sup>107</sup>, B. Dawson<sup>108</sup>, F. Dazzi<sup>109</sup>, A. De Angelis<sup>110</sup>, R. de Cossu dos Anjos<sup>111</sup>, G. De Cesare<sup>112</sup>, A. De  
Franco<sup>113</sup>, E.M. de Gouveia Dal Pino<sup>114</sup>, I. de la Calle<sup>115</sup>, R. de los Reyes Lopez<sup>116</sup>, B. De Lotto<sup>117</sup>, A. De  
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Souza<sup>124</sup>, C. Dell'Inferno<sup>125</sup>, M. Del Santo<sup>126</sup>, C. Delgado<sup>127</sup>, D. della Volpe<sup>128</sup>, T. Di Girolamo<sup>129</sup>, F. Di Piero<sup>130</sup>, L. Di  
Venere<sup>131</sup>, C. Diaz<sup>132</sup>, C. Dib<sup>133</sup>, S. Diebolt<sup>134</sup>, A. Djannati-Asa<sup>135</sup>, A. Dominguez<sup>136</sup>, D. Dominis Prester<sup>137</sup>,  
D. Dorner<sup>138</sup>, M. Doroshenko<sup>139</sup>, H. Drass<sup>140</sup>, D. Dravins<sup>141</sup>, G. Dubus<sup>142</sup>, V.V. Dwarakadas<sup>143</sup>, J. Ebr<sup>144</sup>, C. Eckner<sup>145</sup>,  
K. Egberts<sup>146</sup>, S. Ekerdt<sup>147</sup>, T.R.N. Ekombe<sup>148</sup>, D. Elsässer<sup>149</sup>, J.-P. Ernenwein<sup>150</sup>, G. Espinoza<sup>151</sup>, G. Esposito  
152, M. Fairbairn<sup>153</sup>, D. Falcatone<sup>154</sup>, A. Falcone<sup>155</sup>, C. Farnier<sup>156</sup>, G. Fasola<sup>157</sup>, E. Fedorova<sup>158</sup>,  
S. Fegan<sup>159</sup>, M. Fernandez-Alonso<sup>160</sup>, A. Fernandez-Barral<sup>161</sup>, G. Ferand<sup>162</sup>, M. Fesquet<sup>163</sup>, M. Filipovic<sup>164</sup>,  
V. Fiorentini<sup>165</sup>, G. Fontaine<sup>166</sup>, M. Fornasa<sup>167</sup>, L. Fortson<sup>168</sup>, L. Freixa Corominas<sup>169</sup>, C. Fruck<sup>170</sup>, Y. Fujita<sup>171</sup>,  
Fukazawa<sup>172</sup>, S. Funk<sup>173</sup>, M. Furling<sup>174</sup>, L. Fusco<sup>175</sup>, S. Gabici<sup>176</sup>, A. Gadolin<sup>177</sup>, Y. Galliani<sup>178</sup>, B. Garcia<sup>179</sup>, R. Garcia  
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N. Giglietto<sup>187</sup>, P. Giommi<sup>188</sup>, F. Giordano<sup>189</sup>, E. Giro<sup>190</sup>, M. Giroletti<sup>191</sup>, A. Glielmini<sup>192</sup>, J.-F. Glendon<sup>193</sup>,  
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Kazanas<sup>246</sup>, M. Kachel<sup>247</sup>, B. Kahlir<sup>248</sup>, D.B. Kieda<sup>249</sup>, S. Kimseyeng<sup>250</sup>, S. Kimura<sup>251</sup>,  
J. Knödlseder<sup>252</sup>, B. Koch<sup>253</sup>, K. Kohri<sup>254</sup>, N. Komir<sup>255</sup>, K. Kosack<sup>256</sup>, M. Kraus<sup>257</sup>,  
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L. Lehoucq<sup>269</sup>, M. Lemoine<sup>270</sup>, M. Lemoine<sup>271</sup>, M. Lemoine<sup>272</sup>, N. Ochi<sup>273</sup>, S. Ohm<sup>274</sup>, N. Okazaki<sup>275</sup>,  
P. O'Brien<sup>276</sup>, R. Orto<sup>277</sup>, J.P. Osborne<sup>278</sup>, M. Ostrowski<sup>279</sup>, N. Otte<sup>280</sup>,  
A. Palazzi<sup>281</sup>, M. Palumbo<sup>282</sup>, M. Paluska<sup>283</sup>, R. Paoletti<sup>284</sup>, J.M. Pearson<sup>285</sup>,  
P. Perini<sup>286</sup>, A. Peirone<sup>287</sup>, M. Pech<sup>288</sup>, G. Pedersoli<sup>289</sup>, M. Perni<sup>290</sup>, M. Persic<sup>291</sup>,  
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rouza<sup>304</sup>, G. Pühlhofer<sup>305</sup>, M. Punc<sup>306</sup>, S. Puri<sup>307</sup>, S. Puri<sup>308</sup>, F. Queiroz<sup>309</sup>,  
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F. Rieger<sup>324</sup>, M. Riquelme<sup>325</sup>, S. Rivoire<sup>326</sup>, V. Rizzi<sup>327</sup>, J. Rodriguez<sup>328</sup>, G. Rodriguez Fernandez<sup>329</sup>,  
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G. Rowell<sup>336</sup>, B. Rudak<sup>337</sup>, A. Rugliancich<sup>338</sup>, C. Rullien<sup>339</sup>, I. Sadah<sup>340</sup>, S. Sali-Har<sup>341</sup>, T. Salto<sup>342</sup>,  
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P. Vallania<sup>427</sup>, L. Valore<sup>428</sup>, C. van Eldik<sup>429</sup>, J. Vandenbroucke<sup>430</sup>, G.S. Varner<sup>431</sup>, G. Vasileiadis<sup>432</sup>,  
V. Vassiliou<sup>433</sup>, M. Vázquez Acosta<sup>434</sup>, M. Vecchi<sup>435</sup>, A. Vega<sup>436</sup>, S. Vercollese<sup>437</sup>, P. Veres<sup>438</sup>, S. Vergani<sup>439</sup>,  
V. Verzi<sup>440</sup>, G.P. Veroloni<sup>441</sup>, A. Viana<sup>442</sup>, C. Vigorito<sup>443</sup>, J. Villaverde<sup>444</sup>, H. Voeltz<sup>445</sup>, A. Volhard<sup>446</sup>,  
S. Vorobyov<sup>447</sup>, A. Vozniak<sup>448</sup>, T. Waite<sup>449</sup>, S. Wagner<sup>450</sup>, R. Wagner<sup>451</sup>, R. Walter<sup>452</sup>, J.E. Wall<sup>453</sup>,  
D. Warren<sup>454</sup>, J.J. Watson<sup>455</sup>, F. Werner<sup>456</sup>, M. White<sup>457</sup>, R. White<sup>458</sup>, A. Wierzchowska<sup>459</sup>, P. Willcox<sup>460</sup>,  
M. Will<sup>461</sup>, D.A. Williams<sup>462</sup>, R. Wischnewski<sup>463</sup>, M. Wood<sup>464</sup>, T. Yamamoto<sup>465</sup>, R. Yamazaki<sup>466</sup>,  
S. Yanagita<sup>467</sup>, L. Yang<sup>468</sup>, T. Yoshida<sup>469</sup>, S. Yoshike<sup>470</sup>, T. Yoshikoshi<sup>471</sup>, M. Zacharias<sup>472</sup>, G. Zaharijas<sup>473</sup>,  
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H. Zechlin<sup>480</sup>, V.I. Zhdanov<sup>481</sup>, A. Ziegler<sup>482</sup>, J. Zorn<sup>483</sup>

# La partecipazione attuale al gruppo PHYS

2023

- ~105 membri da istituti italiani
- ~50 nuovi membri (rispetto ~2018)
  - **OAS-BO**, IASF-Mi, INFN-Pg (+Roma+Bari+GSSI+...)
  - Temi: RC, transienti, Pevatr./galattici

NUOVI MEMBRI dal ~2108

A. Tiengo	D. De Martino	M. Landoni	A. Carosi
A. Papitto	B. Olmi	M. Rigoselli	A. Ingallinera
D. Gaggero	A. Tutone	M. Cardillo	R. Bandiera
L. Tosti	F. Pintore	L. Foffano	N. Bucciantini
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B. Patricelli	E. Orlando		
G. Ghirlanda			

Lista da controllare!!

Outlook

ctac The Observatory for General Relativity and Cosmology

wg-physics  
Private group · 557 members

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About Members Email Files

About this group

Description  
Overall PHYS working group of CTAC

Email  
wg-physics@cta-observatory.org

Group members

- AL Alicia Lopez
- FL Francesco Longo
- RO Rene A. Ong
- Luigi Tibaldo

~560 membri

Il sistema del portale e le mailing list sono state recentemente modificate (migrazione a sistema Microsoft) e, per me, al momento è difficile fare conti e statistiche puntuali.

# La partecipazione italiana ai temi KSP

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- CTA consortium papers
- CTA related papers - conference contributions
- PHYS and PWG conveners
- Attività correlate alla scienza di CTA:
  - Science Data challenge (*→presentazione dedicata*)
  - ASTRONET roadmap <https://cta.cloud.xwiki.com/xwiki/wiki/phys/view/ASTRONETROADMAP/>
  - Science operational requirements
- Coinvolgimento in progetti/esperimenti sulla stessa scienza di CTA
  - Esperimenti in svolgimento o preparazione (ASTRI, MAGIC, SWGO, ..., AC-DC)
- Sinergie (MWL-MM coordination <https://cta.cloud.xwiki.com/xwiki/wiki/phys/view/MWL/>)

# La partecipazione italiana ai temi KSP



- CTA consortium papers
- CTA related papers - conferences
- PHYS and PWG conveners

- **Science Data challenge**
- ASTRONET roadmap

## Modelli per il SDC (e proposte osservative)

Model name	Contact person
1 Fermi bubbles (at low latitudes)	Dmitry Malyshev
2 GalaxyClustersSkyModel	Rémi Adam
3 Starburst galaxies	Alessandra Lamastra
4 TES 0229+200	Paolo Da Vela
5 Extragalactic survey	Jean-Philippe Lenain
6 High Quality Spectra AGN & 4LAC pro	Jean-Philippe Lenain
7 Long-term monitoring of AGNs	Jonathan Biteau
8 Cen A	Jean-Philippe Lenain
9 External ToO trappers on AGN flares	Guillaume Grolleron
10 GW-GRB BNS runO5	Antonio Stamerra
11 SS433	Masha Chernyakova
12 Software to assemble Galactic models	Luigi Tibaldo
13 Probing the nature of the Crab flares w	Enrique Mestre
14 Cyg X-1 TeV flare	Giovanni Piano
15 Cyg X-3 TeV flare	Giovanni Piano
16 StellarClustersV1	Giovanni Morlino
17 Neutrino alerts	Konstancja Satalecka
18 PWNe population	Michele Fiori
19 SNRs population	Michele Fiori
20 Int-SNRs	Michele Fiori
21 Cygnus OB2	Stefano Menchiari
22 Westerlund 1	Stefano Menchiari
23 Westerlund 2	Stefano Menchiari
24 Fermi bubbles at high latitudes	Dmitry Malyshev
25 Neutrino alerts	Konstancja Satalecka
26 LMC	Pierrick Martin
27 Neutrino alerts	Konstancja Satalecka
28 Cygnus OB2	Stefano Menchiari
29 Westerlund 1	Stefano Menchiari
30 Westerlund 2	Stefano Menchiari
31 Galactic interstellar model	pedro de la torre luque
32 Galactic interstellar model	Quentin Remi / Pedro De La Torre Luque
33 GRB	Thierry Stolarczyk



R. Zanin - CTAC/CTAO meeting - Granada 2023  
[https://indico.cta-observatory.org/event/4497/contributions/39319/attachments/23570/33932/20230425\\_PS\\_SDC.pdf](https://indico.cta-observatory.org/event/4497/contributions/39319/attachments/23570/33932/20230425_PS_SDC.pdf)

# ASTRONET2021

Last modified by Reahmi Mukherjee on 2021/06/07 18:10

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White papers for ASTRONET 2021

Title -->	Multi-messenger and transient astrophysics with the Cherenkov Telescope Array	Probing extreme environments with the Cherenkov Telescope Array	Origin and role of relativistic cosmic particles	Probing Dark Matter and Fundamental Physics with the Cherenkov Telescope Array
Contact authors	<a href="#">@Alicia Lopez Oramas</a> and <a href="#">@Alessandro Carosi</a>	<a href="#">@Pat Romano</a> and <a href="#">@Jean-Michel Lénain</a>	<a href="#">@Barbara Olmi</a> , <a href="#">@Anabella Araudo</a> , and <a href="#">@Giovanni Morlino</a>	<a href="#">@Fabiolooco</a> and <a href="#">@Manuel Meyer</a>

## Probing extreme environments with the Cherenkov Telescope Array

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<https://www.cta-observatory.org/about/cta-consortium/>

Credit: Gabriel Pérez Díaz (IAC)/Marc-André Besel (CTAO)/ESO/ N. Risinger (skysurvey.org)



## Multi-messenger and transient astrophysics with the Cherenkov Telescope Array

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## Probing Dark Matter and Fundamental Physics with the Cherenkov Telescope Array

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SCIENCE VISION & INFRASTRUCTURE ROADMAP 2022-2035

## A STRATEGIC PLAN FOR EUROPEAN ASTRONOMY

Executive Summary

## Origin and role of relativistic cosmic particles

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<https://www.cta-observatory.org/about/cta-consortium/>

Announcement 2023 May/June

8 maggio 2023

## The "Strategic Plan for European Astronomy" Ranks the CTAO as Highest Priority in Ground-based Astronomy

The recently-released ASTRONET Science Vision and Infrastructure Roadmap 2022-2035 includes the CTAO as the top-ranked priority amongst new ground-based infrastructure projects. The strategic plan highlights that "as the first true large-scale observatory targeting these (very high) energies, it [the CTAO] is expected to lead to breakthroughs in our understanding of the origin and production of non-thermal particles in the Universe." The ASTRONET roadmap provides an overview of the status of European Astronomers, as well as recommendations to funding agencies for the next decade, based on the priorities of the community.

The 2022-2035 roadmap emphasizes CTAO's unique capabilities and the strong support it receives from the

# CTA consortium papers



Noni da inserire e completare?

2018

## Planned Consortium publications

KSP	PUBLICATION TOPIC	GAL	CR	EGAL	TRANS
DM	CTA sensitivity to DM annih. in the GC				
	CTA sensitivity to DM annih. in dwarf galaxies	pubblicato			
GPS	Updated paper describing GPS in more complete detail than in A.Ph. article	X			
LMCS	Prospects for the detection and study of SN 1987A using CTA	X	X		
	Probing cosmic rays in the LMC using CTA	X	X		
	Dark matter in the LMC	X	X		
EGALS	Transient survey with divergent pointing			X	X
TRANS	Science of Galactic transients	X			X
AGN	Expected AGN population based on latest Fermi catalog and performance curves			X	
	Evaluate the number of expected flares of AGNs as a function of redshift and AGN class based on long-term light-curves from F-LAT			X	
	Studies of the EBL, IGMF (pair echo), ALPs, LIV (pair threshold modification)	pubblicato			
	Focus on spectral modifications due to line-of-sight effects			X	
GAL.CL	CTA Prospects for Studying Dark Matter and Cosmic Rays in Clusters of Galaxies		X	X	

## Il contributo ai consortium paper

Aprile 2023

KSP/SWG	GAL	EGAL	CR	Trans	DMEP
GPS	GPS		*		
GC survey	*		Electrons GC astro		Morselli GC DM
AGN	Prandini	AGN pop gamma prop			
	Romano Vercellone	AGN variability *		extra-gal v sources	
DM				Doro Saturni Morselli Rodriguez	Gal. clusters Dwarf gal. DM Lines
			LMC survey	Bernardos, Iocco	*
Gal. clusters			Perseus cluster		*
PeVatrons	PeVatrons				
SFS		Olmi	* Menchian Morino Amato	CRs in SFS	
Transients				v transients GRBs GW CC SNe Gal. transients	Shiranda Nava Longo Romano Spolon Zampieri Mereghe Papitto
				Stamerra Nava Patricelli	
					Novae

Credit: S. Vercellone  
"KSP e partecipazione INAF"  
Ottobre 2017

F. Longo, A. Lopez Oramas - Granada CTAC/CTAO meeting 2023  
[https://indico.cta-observatory.org/event/4497/contributions/39326/attachments/23583/33951/Science\\_Coordinators\\_Report\\_Granada\\_April2023.pdf](https://indico.cta-observatory.org/event/4497/contributions/39326/attachments/23583/33951/Science_Coordinators_Report_Granada_April2023.pdf)

## CTA related papers - conference contributions

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- Lista dei progetti/articoli in preparazione (non-consortium):
  - <https://cta.cloud.xwiki.com/xwiki/wiki/sapo/view/Publication%20Projects/>
  - Review system: <https://indico.cta-observatory.org/event/1075/contributions/>
  - 35 progetti a maggio 2023
- Contributi a conferenze:
  - Pagina SAPO: <https://cta.cloud.xwiki.com/xwiki/wiki/sapo/view/Event/>
  - Più vecchie: <https://cta.cloud.xwiki.com/xwiki/wiki/sapo/view/Summer%202022%20Conferences/>
  - *Difficile stimare il contributo italiano (per la difficoltà di fare ricerche sistematiche sulla tabella SAPO, per l'ordine alfabetico, etc etc); idem su ADS.*



# Working group coordinators (Italia)



Working group coordinators and deputies for 2023

Science Working Group	Coordinator	Deputy
Science coordination	@Francesco Longo	@Alicia Lopez Oramas
Galactic	@Heide Costantini	@Quentin Remy
Cosmic-ray	@kathrin egberts	@Pierre Cristofari
Extragalactic	@Elisa Prandini	@Elisa Pueschel
Transient	@thierry stolarczyk	@Elisabetta Bissaldi
DMEP	@Manuela Vecchi	@Nagisa Hiroshima
Intensity interferometry	@Andreas Zmija	@Luca Zampieri

2023

Working group coordinators and deputies for 2022

Science Working Group	Coordinator	Deputy
Science coordination	@Luigi Tibaldo	@Francesco Longo
Galactic	@Barbara Olmi	@Heide Costantini
Cosmic-ray	@Giovanni Morlino	@kathrin egberts
Extragalactic	@Jean-Philippe Lenain	@Elisa Prandini
Transient	@Alicia Lopez Oramas	@thierry stolarczyk
DMEP	@Fabiolocco	@Manuela Vecchi
Intensity interferometry	@Prasenjit Saha	@Andreas Zmija

2022

Barbara Olmi  
Alessandro Carosi  
Stefano Vercellone  
Elisa Prandini  
Elisabetta Bissaldi  
Giovanni Morlino  
Patrizia Romano  
Francesco Longo  
Fabrizio Tavecchio  
Aldo Morselli  
Luca Zampieri  
.....

CTAC Science Coordinator: Stefano Vercellone (INAF)  
CTAC Deputy Science Coordinator: Stefan Funk (FA)

2018

<p><b>1. Galactic</b></p> <ol style="list-style-type: none"> <li>Jamie Holder (Coordinator, U. Delaware)</li> <li>Roberta Zanin (Deputy, MPI-K)</li> </ol> <p><b>2. Cosmic-rays</b></p> <ol style="list-style-type: none"> <li>Stefan Ohm (Coordinator, DESY)</li> <li>Sabrina Casanova (Deputy, IFI-PAN)</li> </ol> <p><b>3. Extra-galactic</b></p> <ol style="list-style-type: none"> <li>Elina Lindfors (Coordinator, U. Turku)</li> <li>Fabrizio Tavecchio (Deputy, INAF)</li> </ol> <p><b>4. Transients</b></p> <ol style="list-style-type: none"> <li>Catherine Boisson (Coordinator, Obs. Paris)</li> <li>Daniela Hadasch (Deputy, ICRR)</li> </ol>	<p><b>5. Dark matter and exotic physics</b></p> <ol style="list-style-type: none"> <li>Fabio Zandanel (Coordinator, Gronov test.)</li> <li>Aldo Morselli (Deputy, INFN)</li> </ol> <p><b>6. Intensity interferometry</b></p> <ol style="list-style-type: none"> <li>Dainis Dravins (Coordinator, Lund Obs.)</li> <li>Michael Daniel (Deputy, CFA)</li> </ol> <p><b>Multi-wavelength and synergies</b></p> <ol style="list-style-type: none"> <li>Sera Markoff (Coordinator, U. Amsterdam)</li> <li>Emma de Oña Wilhelmi (Deputy, IEEC-CSIC)</li> </ol>
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Working group coordinators and deputies for 2021

Science Working Group	Coordinator	Deputy
Science coordination	@Elina Lindfors	@Luigi Tibaldo
Galactic	@Fabio Acero	@Barbara Olmi
Cosmic-ray	@Anabella Araudo	@Giovanni Morlino
Extragalactic	@Pat Romano	@Jean-Philippe Lenain
Transient	@Alessandro Carosi	@Alicia Lopez Oramas
DMEP	@Manuel Meyer	@Fabiolocco
	@Tarek Hassan	@Prasenjit Saha

2021

Tutti i PWG sono stati coperti da coordinatori italiani

# Conclusioni

- La comunità italiana è coinvolta nelle attività scientifiche connesse ai temi dei KSP
- Si tratta di decidere su quali KSP focalizzarci e quali ulteriori competenze attirare e coinvolgere, tra le numerose disponibili qui, e quelle “là fuori”:
  - Negli esperimenti al TeV (ASTRI, MAGIC, SWGO, ....)
  - Ad altre frequenze (radio? X-ray? MeV? CR? ....)
  - nei nostri istituti.

*In attesa del vostro  
riscontro per correzioni,  
aggiornamenti alle  
tabelle e elenchi!*

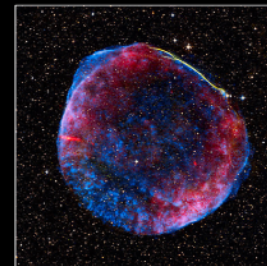
# Conclusioni

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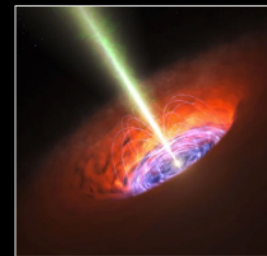
## Theme 1: Cosmic Particle Acceleration

- How and where are particles accelerated?
- How do they propagate?
- What is their impact on the environment?



## Theme 2: Probing Extreme Environments

- Close to neutron stars and black holes?
- Relativistic jets, winds and explosions?
- Cosmic voids



## Theme 3: Physics Frontiers

- What is the nature of Dark Matter?
- Is the speed of light a constant?
- Do axion-like particles exist?

