

Twenty years of beautiful collaboration with Andrew Lyne, or in other words...

The amazing story of the COBRA and the MONGOOSE

by Nichi D'Amico

My collaboration with Andrew begun in April 1987, when I joined him and Dick Manchester at Jodrell Bank, for a meeting, and we approached the general design of new pulsar experiments to be carried out at Parkes. Since then, we made a lot of progress, and have achieved very successful results working in a large collaboration team at Parkes, but the most exciting experiments were definitely those carried out in the most recent ten years, using the Parkes multibeam receiver and back-ends. And the story of the COBRA and the MONGOOSE refers indeed to this period.

Preamble.

Once upon a time....I called for a group meeting the two young fellows, Andrea and Marta (we were still in Bologna, Andrea had a post-doc position, and Marta was only an undergraduate) and I told them:

"people:: now, "they" have a  (aaarg!). How we can compete with them ?" (NdR: COBRA is a supercomputer)

So, we decided to apply to the Ministry of Research for a grant, in order to build our own supercomputing machine, and see if the Italians could compete with the British in the discovery of exotic pulsars hidden in the data of this beautiful experiment we were part of, the Parkes multibeam survey. It took a while, but in the end we managed to get a small grant and build a 20 nodes (2 CPU each) cluster, rather small compared to COBRA, but we were enthusiastic !!! Around that epoch we all moved to Cagliari, in Sardinia.

So, in Cagliari, we stamped the Italian flag on the machine, and then: *which name we can give to this machine to push it towards the glory ?*

Mini-COBRA ?

Small-COBRA ?

...Bleah !...

We must find a nice acronym of something, as "they" did !. So we start:

M? oh, yes, **M** for “**M**ulti processor”, there are multiple CPUs inside !

A? oh, yes, **A** for “**A**rray”, this is of course an array !

NG? oh, yes, **NG** for “**N**ew **G**eneration”, no doubt this is something new !

US? uhm..., oh well, **U** and **S** for **pU**lsar **S**earches ! 😊

TA? oh, yes, **TA** for “**T**iming **A**nalysis”, no doubt we will use it for timing !

Multiprocessor **A**rray for **N**ew **G**eneration **pU**lsar **S**earches and **T**iming **A**nalysis

MANGUSTA !!!

...which, of course, is the Italian name of the MONGOOSE !



The first round.

Some time later, we started at Parkes the high latitude survey, and I remember in May or June 2003, Marta (now a PhD student) pushing MANGUSTA to reduce the follow-up observations of an interesting millisecond pulsar suspect, which was promising to be a binary.

When we realized that the orbital period was short, about two hours, that the system was slightly eccentric, and that we could even measure the advance of periastron within few weeks.... 😊, Marta jumped and rushed onto the telephone:

"...we have to call Andrew and Dick !!! "

and me: *wait, wait, Marta, ...you know..., ...we have first to better understand the data..., we have to do many checks,it can take a while..., we could be wrong... So we decided to add the most recent data, ...but at the same time we could not resist to start thinking on the implications of such a major discovery and drafting an abstract...*

After a week or so, we realized that it was really unfair to keep the secret longer and I called Andrew:

I told Andrew about the orbital period, and he said:.....

Oh, Yes !

Then I told him about the eccentricity, and he said:.....

Oh, Yes !

Then I told him about the periastron advance, and he said: Oh, Yes !

He was definitely happy, but I could definitely hear his voice going down and down as I was listing the parameters... And I think I could imagine that he must have been thinking something like:

"....aarg !!! the Italians and their MONGOOSE !!!..."

BUT, there is justice in this world, there is definitely a superior scheme which provides equal opportunities to all:

... and after few months, the game changed in favor of the British....

The second round.

You must know that within the collaboration, after some insight into the evolutionary scheme of this binary system, we had the feeling that the neutron star companion to this binary pulsar could have not traveled too much in the B-P diagram, and that it could be still visible as pulsar !!! So we were all keen to push processing the data and trying to find the pulsar companion!

However, as we usually adopt a fair play with respect to the students, we decided to give to Marta the first go:

"OOOK Marta, youuu have the first go, nooo worries"

So, we started again pushing MANGUSTA, but we have to admit that in Italy we were following the wrong approach: we had in mind a weak source (this was indeed a good reason for not having seen it!), so we were pushing long integrations, which in the case of a binary system needs to spend some CPU, we needed to "de-orbit" the data, etc...

Then, one day I received a strange e-mail from Andrew:

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Subject: Phone conversation
From: Andrew Lyne <agl@jb.man.ac.uk>
Date: Sun, 19 Oct 2003 09:18:33 +0100 (BST)
To: Nichi D'Amico <damico@ca.astro.it>
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Dear Nichi,

I would like to chat to you rather urgently about a bit of an accident.

Andrew

This was rather worrying ! *An accident ? Which sort of accident ? An accident at Parkes may be ? May be Fernando is there and he has found again a bug in my beautiful real-time program "PMMON" ?* You see, the e-mail was sent in the morning, but it was Sunday, and I could read it only late at night. *An accident ? I remember that a while ago a real accident occurred at Parkes: Simon was observing, and*

suddenly he realized that there was no signal on the chart recorder ! That was because the receiver fall down !!! It was now the turn of the Multibeam receiver ??? I could no believe that ! Why Andrew has not mentioned which sort of accident ? aarg...Andrew... Should I call Andrew at home NOW ? Uhm...I also have a wife, and I know the feeling... I better wait until tomorrow morning! --I really could not sleep that night.

The day after, I called Andrew at Jodrell. Michael was also there, so Andrew put the phone in hand-free and we could chat.

me: So, Andrew, is every thing OK ?

Andrew: Oh, yes, yes...You know... Duncan is at Parkes at the moment...

me: something wrong with him ?

Andrew: No, no, ...but you know... he was working on a new software for binary searches,...and he though that it was a good idea to do some checks on some new data just taken on 0737...

me: oh, yes, that's a good idea... and could he easily find the pulsar with the new code... I mean, is the pulsar still alive ?

Andrew: oh, yes, yes, well and sound... but he could also see a strange few-seconds period signal, which was detectable only occasionally...

me: oh, that's again that bad interference...

Andrew: ...actually it is not. He could see very well that this periodicity is Doppler shifted...with exactly the same orbital period of 0737...

me:uhm....., do you mean....., ...uhm..... I mean....uhm...do you mean

Then suddenly, I remembered the Andrew voice going down and down when I told him about the original discovery, and I realized that now, my voice was going down and down, exactly with the same shape !!! And so I realized that a second major discovery was made: the first ever know double pulsar! The second round of the story of the COBRA and the MONGOOSE was already over, but this time it was definitely in favor of the British !!!

This is the amazing story of the COBRA and the MONGOOSE, which reflects the character, the reciprocal sympathy, and professional estimates of the people involved, and represents a testimony of a very exciting period in term of science, passion, and human relations.