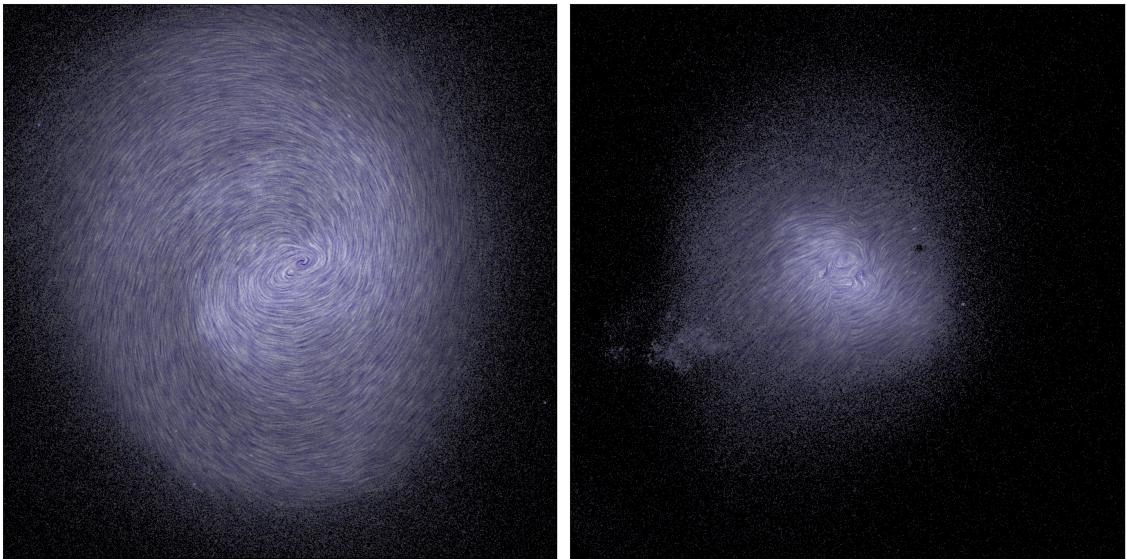


## 2. Naloga: Delo z javno dostopnimi podatki

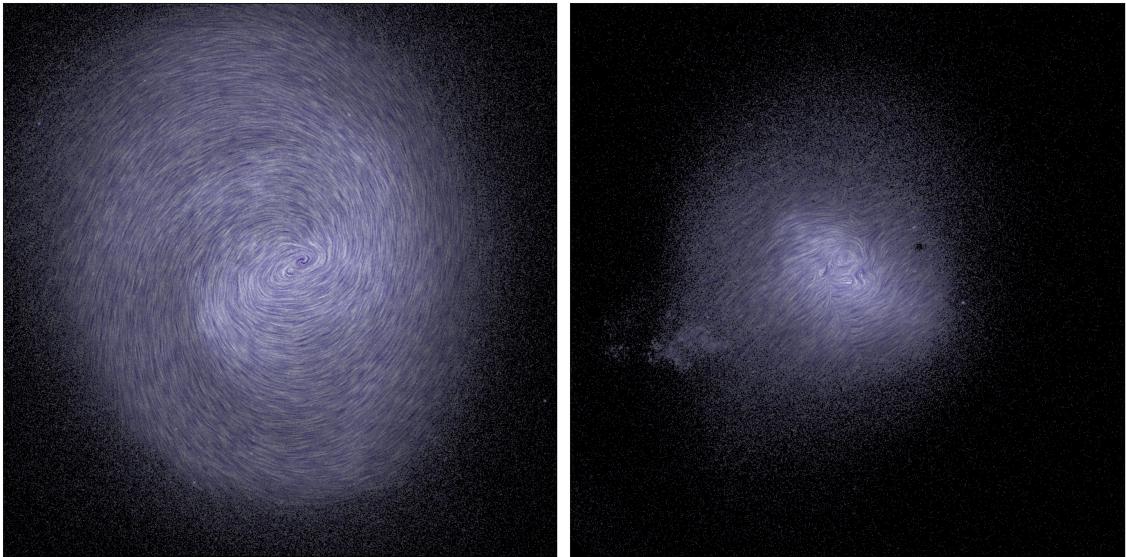
1. V literaturi najdi oddaljenosti Velikega Magellanovega oblaka (LMC) in Malega Magellanovega oblaka (SMC). Na kakšen način je bila oddaljenost izmerjena? Kako natančne so meritve? Koliko se razlikujejo med posameznimi viri?
2. Kakšno navidezno svetlost imajo nadorjakinje z absolutno magnitudo  $M_G = -4$  v LMC in v SMC?
3. Kolikšen je razpon paralaks, ki jih pričakuješ za zvezde v LMC in v SMC?
4. Uporabi zgornja dva kriterija, da iz *Gaia* EDR3 kataloga izbereš zvezde v LMC in v SMC. Ne pozabi še kriterija za največjo oddaljenost od središča galaksij na nebu.
5. Iz *Gaia* EDR3 kataloga izberi lastno gibanje zvezd in vizualiziraj kako se obe pritlikavi galaksiji vrtita. Radialne hitrosti ne upoštevaj.
6. Čim bolje repliciraj spodnji sliki (LMC levo in SMC desno), ki vizualizirata vrtenje galaksij s tokovnicami (vir: <https://www.cosmos.esa.int/web/gaia/edr3-structure-magellanic-clouds>).



7. (*Dodatekno*) Najdi katalog, kjer so dobro pomerjene tudi radialne hitrosti zvezd v LMC ali SMC. Združi katalog z Gainimi meritvami lastnih gibanj in poskusi razvozlati vrtenje galaksij v treh hitrostnih dimenzijah.

## 2. Homework: Using public data

1. Find the distance to the Large Magellanic cloud (LMC) and the Small Magellanic cloud (SMC) in the literature. How were the distances measured? How precise are the measurements? Do they vary between different sources?
2. What is the apparent magnitude of a supergiant with an absolute magnitude of  $M_G = -4$  in the LMC and SMC?
3. What is the range of parallaxes expected for stars in the LMC and the SMC?
4. Use the criteria above to select stars that belong to the LMC and the SMC in the *Gaia* EDR3 catalogue. Do not forget to limit the distance from the galaxy centers on the sky.
5. From the *Gaia* EDR3 catalogue select the proper motions of stars and visualise how both dwarf galaxies rotate. Do not take the radial velocity into account.
6. Replicate the bottom images as well as you can. They visualise the rotation of the LMC and the SMC using streamlines (source: <https://www.cosmos.esa.int/web/gaia/edr3-structure-magellanic-clouds>).



7. (*Extra credits*) Find a catalogue with well measured radial velocities of stars in the LMC or the SMC. Combine it with Gaia's proper motions and try to disentangle how the galaxies rotate in three velocity dimensions.